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Section of Obstetrics and Gynæcology

President—FREDERICK W. ROQUES, M.D., M.Chir., F.R.C.S.Eng., F.R.C.O.G.

[*February* 25, 1955]

DISCUSSION: DYNAMICS OF THE UTERUS AND THEIR CLINICAL APPLICATIONS

Professor W. C. W. Nixon: On October 4, 1871, John Braxton Hicks, F.R.S., M.D. (1823–1897), gave his Presidential Address before the Obstetric Society of London—a forerunner of the Obstetric Section of the Royal Society of Medicine. For twenty-three years he was Physician Accoucheur to Guy's Hospital and on retiring at the age of 60 was invited to help in teaching in the midwifery department of St. Mary's Hospital, an embryonic teaching hospital compared with the much older Guy's Hospital.

His address was entitled "On the Contractions of the Uterus Throughout Pregnancy: Their Physiological Effects and their Value in the Diagnosis of Pregnancy". Perhaps his name is better known for "combined internal and external version" but he must be given credit for first drawing attention to the phenomenon of intermittent uterine contractions during pregnancy. Braxton Hicks had no instrument except his hand to register such contractions, but even so he was aware that there were different degrees of tonus and activity of the uterus during pregnancy and labour. He confirmed Baudelocque's dictum "the hand is still the safest of the obstetrician's instruments".

He reflected upon the effect or use of these contractions and suggested that the blood in the placental sinuses was in a stagnant state and the effect of the contractions was to drive it on so that they "act as a kind of supplementary heart to the fluids in the uterine wall and placenta". He noted that the contractions were really the same as the so-called "pains" of premature expulsion of the fœtus and also of true labour.

Another interesting observation he made was in a case of paraplegia in pregnancy. Although he observed the woman frequently during pregnancy yet he never found the uterus to contract and her labour was normal.

It was at a meeting of this Section, in 1948, when there was a "discussion on the management of uterine inertia in the first stage of labour", that Lorand's tocograph was first shown. With this instrument it was possible to assess the activity of the uterus at a three-dimensional level—centimetres, grams, seconds. Since its introduction many complicated pieces of electrical apparatus have been designed for measuring uterine activity. For Braxton Hicks it would be a Wellsian dream if he were with us to-night.

Yet Lorand's tocograph, which took fifteen years to perfect, has still its uses. Recently I spent some time in the Obstetric Department of University College, Ibadan, Nigeria, where Dr. John Lawson is Director. I present some records which I made with this apparatus.

Fig. 1 shows tracings in the first stage of labour from four African women who were in the labour ward at the same time. The striking feature is the high uterine tone and in one of these women this was associated with the development of intrapartum toxæmia. The blood pressure rose from 100/60 to 140/95 (a high level for African women) in twenty-one hours. During the same interval urine which was albumin free at the onset of labour boiled almost solid when the tocograph record was made.

The African uterus in labour seems to be an unusually powerful organ as can be seen from Fig. 2.

Rarely is the head engaged at the onset of labour owing to the high inclination of the pelvic brim. Dr. Lawson states that in these women the outcome of a trial labour cannot be assessed properly until full dilatation is reached. If one waits until full dilatation the head often moulds successfully through the brim. But for this ability of the uterus to dilate fully though the head is high, many of these women would not deliver themselves vaginally. Hyperactivity of the uterus needs to be investigated and might provide a fertile field for those engaged in biochemical and endocrine research. Such research might give a clue to the requisites for normal uterine action.

Industry harnesses scientific advances when it seems possible that benefit will result. Medicine and surgery are beginning to apply scientific methods for the diagnosis and treatment of disease, but obstetrics—the Cinderella of the trinity—lags. The obstetrician has contributed little to the elucidation of the problem of abnormal uterine action in labour. This is still a major cause of morbidity and mortality for a mother and her baby during

the process of birth. Our aim should be to anticipate long labour and maintain the duration of labour within normal limits. It will be a team consisting of obstetrician, biochemist and physicist, that will eventually solve the problem.

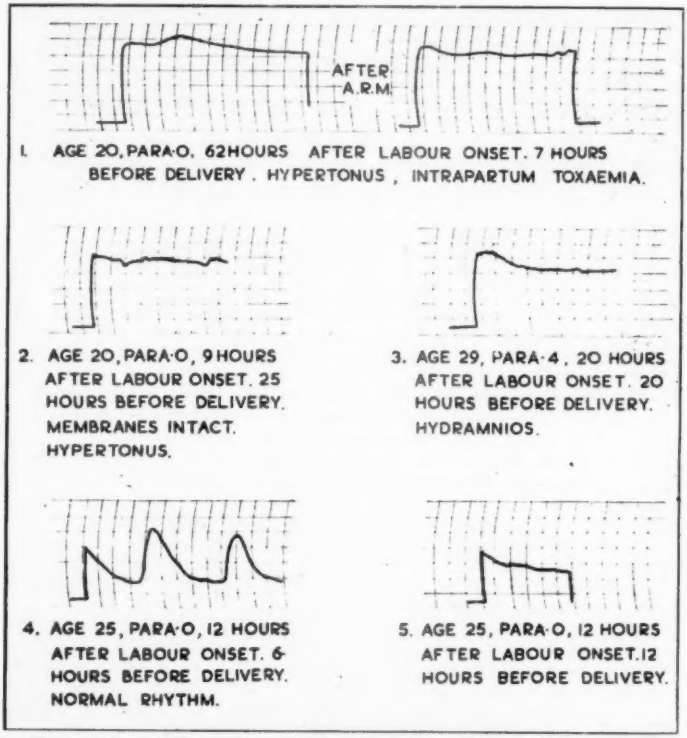
AFTER A.R.M.
1. AGE 20, PARA·0, 62 HOURS AFTER LABOUR ONSET. 7 HOURS BEFORE DELIVERY. HYPERTONUS, INTRAPARTUM TOXAEMIA.
2. AGE 20, PARA·0, 9 HOURS AFTER LABOUR ONSET. 25 HOURS BEFORE DELIVERY. MEMBRANES INTACT. HYPERTONUS.
3. AGE 29, PARA·4, 20 HOURS AFTER LABOUR ONSET. 20 HOURS BEFORE DELIVERY. HYDRAMNIOS.
4. AGE 25, PARA·0, 12 HOURS AFTER LABOUR ONSET. 6 HOURS BEFORE DELIVERY. NORMAL RHYTHM.
5. AGE 25, PARA·0, 12 HOURS AFTER LABOUR ONSET. 12 HOURS BEFORE DELIVERY.

FIG. 1.—Tocograph recordings taken at University College, Ibadan, Nigeria, using Lorand's tocograph.

FIG. 2.—Woman in obstructed labour.

(By courtesy of Dr. John Lawson, Director of Obstetric Dept., University College, Ibadan, Nigeria).

There must be some "trigger" mechanism, possibly biochemical, that initiates labour and such a team as just described might discover it.

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Dr. C. N. Smyth: In discussing the dynamics of the uterus and their clinical applications, I would prefer to use the term "Possible Clinical Applications" because much of what we have to report is as yet only substantiated on a few patients.

Our object in making measurements on patients in the Obstetric Unit attached to University College Hospital is to measure the forces on the fœtus and try from our results to prognose the outcome of labour, and where possible use the conclusions as a guide to treatment.

One fact which stands out clearly from all work on uterine contractility in the past is that it has contributed nothing to the safety of labour, to the reduction of the stillbirth rate, nor to the reduction of maternal discomfort or morbidity—psychic or somatic. The accurate control of oxytocin infusion is perhaps the exception to this generalization. In view of this, we approach the subject with humility and attempt more careful analysis of each clinical observation and physical measurement.

The measurements we are making are simple and, in their implications, as direct as possible. We assess the robustness of the mother and of the fœtus and the possible severity of the approaching labour and try to plan accordingly. We aim at assessing to the following schedule: Firstly, the customary clinical assessments of the mother's health and temperament, the mother's pelvic adequacy (X-ray if doubtful), and the possibility of disproportion, malpresentation or obstruction, are made; sometimes of the flexibility of the pelvic ligaments also. Secondly, the fœtus is assessed in respect to:

(1) Maturity and size (X-ray as necessary).

(2) Regularity of the fœtal heart between contractions.

(3) Regularity of the fœtal heart during contractions.

(4) Regularity of the fœtal heart while the mother is being gradually de-oxygenated, by breathing nitrogen, to 80%, a test which is only undertaken if (3) is satisfactory and immediately discontinued if there is any sign of fœtal distress. This test has been elaborated by Dr. P. R. Myerscough, of the Simpson Memorial Hospital, Edinburgh, and used at University College Obstetric Hospital, while he was working with us.

(5) Measurement of uterine oxygenation polarographically, a procedure at present under development.

If our impression from the above observations and tests is that the fœtus is good for a normal labour but not for a strenuous or prolonged labour then we try to assess the type of labour which will ensue.

In this work we have been busy establishing normal criteria and it will be some time before we are able fully to realize the programme I have outlined. But I believe it is the approach by which we shall turn physical measurements to good account and reduce the hazards of labour. Thirdly, *Assessments of the possible course of labour.*

Part I. The approach of labour.—We are attempting to establish a technique to determine when active labour will begin spontaneously or in response to surgical induction. We have noticed a marked change in the irritability of the uterus towards the onset of labour (true or false) and this is concurrent with a change in the sensitivity of the uterus to intravenous oxytocin (Pitocin) in near physiological doses (1/100 unit/minute). We administer up to 1/10 unit I.V. to patients not having contractions until a contraction ensues. Near labour 1/100 unit will evoke a contraction. A week earlier ten times the dose may be required. The contractions are recorded by tocograph. The test seems to be of value in deciding when to keep a patient in hospital or when to send her home again; and, also, when to induce labour, if other factors are not more weighty. The test may establish the patient's confidence in her treatment, and she feels less shamefaced if sent home as "not in labour", realizing that the judgment was not something she could have made herself.

The test does not distinguish a false labour from a true labour and is useless in the presence of regular contractions. The problem of false labour or the labour that begins normally and then stops for some days needs much study. All we can say is that such patients as a group carry a worse prognosis for fœtal asphyxia and neonatal morbidity than normals; the fœtal heart rate should be watched with more than normal attention when true labour occurs.

Part II. The character of the "pains".—The uterine contractions and the tone between contractions effect the first stage of labour, but their frequency and intensity within wide limits form no guide to the length of the first stage of a particular patient. Their function is to dilate the cervix, to advance the presenting part along the birth canal, and assist, we believe, the uterine circulation.

Statistically we know that contractions should occur about every three to five minutes and raise the intra-amniotic pressure from 40–60 or even 100 mm. of mercury, but in some very satisfactory labours these criteria are not satisfied.

With some drugs we can increase the frequency of contractions, with others reduce both their frequency and amplitude. We have not got a medicine to increase the peak intensity

of the contractions. This is something which usually time provides, and the lack of force in oxytocin-induced contractions may in some cases explain the ineffectiveness of oxytocin inductions; for the rhythmic contractions are invariably produced but they may be too weak, and increasing the oxytocin dosage only increases tonus.

One factor which increases the intensity of contractions is a reduction in fluid volume of the uterus by rupture of the membranes. This is in accordance with muscle studies on the increase of strength with reduction in stretched length.

The only quality of contraction which can be measured unequivocally is the intra-amniotic pressure and this can be measured absolutely by the Williams-Stallworthy technique of amniotic catheterization, or almost equally accurately through the abdominal wall by a tocograph which measures the force required to flatten a given area or produce a depression of given volume. The former, if used with a guard ring equal in width to skin thickness or greater, is extremely accurate (± 1 cm. water)—even through several layers of bedclothes too!

One must beware of instruments which measure curvature and do not positively flatten or indent the surface, for such devices are deflected more over weak areas in the uterine wall, and follow uterine movements to a marked extent.

Part III. The dilatation of the cervix.—The dilatation of the cervix is effected not, as in the iris of the eye, by the interplay of intrinsic muscles alone but by the transmitted pull of the fundus and the reaction of this force upon the fœtal head (or presenting part) and upon the uterine moorings. Redman (1953) has adequately explained the active importance of the moorings in the first stage and I will not go into that aspect of the subject further.

We have not been able to design a more satisfactory instrument than a long stitch through both edges of the cervix, knotted to one, and hanging down the leg, with which to render movements of the cervix visible externally; it is not a popular device to apply. Accordingly, we deduce the probability of rapid cervical dilatation by measuring the forces acting upon the cervix, all of which forces summate to the pressure of the presenting part against the undilated inner surface.

In studies on the cervix we began first with the blithe assumption that the pressure upon the cervix would be the hydrostatic pressure in the amniotic sac, or an even greater pressure if the membranes were ruptured and the os partly dilated.

In the cases we have measured this pressure has always been very much lower than this expected value.

Reasons for the "head to cervix" pressure being low may be divided into the following categories:

(1) "Uterine cuddling"—"active uterine retention." The fœtus is gripped around the shoulders (not a likely condition when there is adequate fluid and intact membranes).

(2) The strength of the membranes. The membranes themselves withstand the fundal pressure and are unable to slide down to "balloon" the cervix. The breaking strength of the membranes, 200 grams (I have no value for Young's modulus or fatigue of membranes), could stand a pressure of 40 mm.Hg, or reduce the pressure on the cervix by this amount.

(3) The head, by forming a valve in the pelvis, prevents the hydrostatic pressure in the hind-waters from being transmitted to the forewaters (this can be measured by measuring the pressure in the forewaters).

(4) Mechanical difficulty in descent of the head. The freedom of the head and movement with contractions can be felt clinically.

In many cases more than one factor is present at once. (N.B.—The high head in multiparous patients and in African women may assist in rapid dilatation, if the uterine cervical moorings do not prevent the cervix from coming into proximity with the head because full hydrostatic pressure is developed in the "forewaters" and the cervix is not pinched at the pelvic brim.)

Treatment.—Treatment of some of these conditions when recognized can be appropriately directed. Treatment of cases in which there is "uterine cuddling" or a truly resistant cervix (if there is such an entity) needs consideration, and we are thinking on the following lines:

(i) Drugs which relax the uterus may if given in small doses have a bigger proportional effect where the muscle is thin (lower segment) than on the fundus, and their administration may allow freer descent in cases of uterine cuddling. I believe I have in a few cases secured this effect with subcutaneous adrenaline. Increasing the fluid volume of the uterus might have a similar effect on theoretical grounds.

(ii) The resistant cervix has a structure which is part muscles and part fibrous and we must ask ourselves what changes in the micro-anatomy we expect to occur during dilatation. I hope histologists may come to our aid here, for by understanding the relative

arrangement of fibrous and muscular tissue we shall better understand how to secure dilatation without permanent impairment of muscular activity.

We need to know whether the muscle fibres in the cervix stretch and remain active to five or ten times their undilated length, or whether they break or separate. The latter would seem the most probable on general biological grounds and because some contractility returns to the cervix immediately after delivery.

To achieve a separation of intact functional muscle fibres and loosening of fibrous bonds between them do we require the muscle of the cervix or lower segment to contract or relax? If the muscle contracts the tension in the fibrous tissue between the muscle bundles will be greater and the fibrous tissue will be distended to the greatest extent.

I trust the general impression of my paper has not been one of over-mechanization of the labour ward; this work can go on almost unnoticed, and no discomfort need be added to the patient's already heavy lot.

Acknowledgments.—On behalf of the Obstetric Unit, University College Hospital, I would like to express our gratitude to the Nuffield Foundation, who have made this work possible.

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Dr. P. R. Myerscough (now at the Simpson Memorial Hospital, Edinburgh) and **Dr. H. O. Schild:**

Biological Assay of Oxytocic Drugs on the Human Uterus

Extensive use has been made of the animal uterus in testing oxytocic drugs, with results which are often misleading when applied to the human subject. Oxytocic drugs have also been tested on the post-partum human uterus using intra-uterine balloons, but this method is elaborate and potentially dangerous and is not suitable for the large-scale experiments required for a statistically valid assay. We have therefore turned to external tocography of the post-partum uterus for the quantitative assay of oxytocic drugs. If successful, this method would allow oxytocic drugs to be tested with the minimum of discomfort and risk to the patient and would make it possible to carry out tests on a sufficiently large scale to obtain statistically valid estimates of activity. An extensive preliminary investigation with ergometrine led to the following conclusions:

(1) External tocography with a suitably modified deep-pressure tocograph is feasible within at least the first three or four days *post partum*. There is no significant diminution of response of the uterus to ergometrine during this period.

(2) Using small intravenous doses of ergometrine it is possible to obtain a graded response, suitable for a biological assay. The log-dose response curve is approximately linear over a fourfold range of concentrations.

(3) The assay can be made more accurate if more than one dose is given to the same patient. In this way the effects of variability between different patients can be largely eliminated from the assay.

We have also used this method for comparing the activity of ergometrine and methyl ergometrine. The former was found to be more active. The assay was carried out by a standard 2×2 design such as is used in assays on isolated preparations. The order of accuracy of the assay is comparable to that obtained in animal experiments. In the course of this work we had occasion to test several compounds which have been claimed to have oxytocic activity in man on the basis of experiments on various animal species. Very marked discrepancies were found between the activity of these drugs on the animal uterus and their activity on the post-partum human uterus when tested by our quantitative method.

Dr. C. N. Smyth limited his reply to two issues which were directly relevant to his work, namely: (1) The force upon the cervix; and (2) the accuracy of tocograph measurements in relation to internal measurements of intra-amniotic pressure.

(1) *The force upon the cervix.*—During a uterine contraction there will be a force upon the cervix from the attempt of the presenting part to descend, or from the hydrostatic pressure bulging the membranes unless neither of these entities is free to descend and press upon the cervix, or unless the cervix is not free to be pulled up to meet them because of its vaginal moorings.

Unless, therefore, a pressure is developed upon the inner surface of the cervix just beyond the cervical canal it is incorrect to say that the cervix is resistant to dilatation. This pressure can be measured by a small balloon. The cause of prolonged labour should be ascribed to cervical resistance only when it is justified by measurement.

(2) *The interpretation of the external tocograph readings.*—There are many types of tocograph in use and the results they give are not directly comparable between themselves or with amniotic pressure measurements made by direct catheterization. Dr. Smyth said

he was not referring to the accuracy of the transmission systems which produce the record, whether electrical, mechanical or hydrostatic, for these were matters of convenience only, but to the design of the receptor which rests upon the abdomen.

In the type in common use this device rests upon the abdominal surface and is held in position by a belt or by local adhesive tape. All have a central rod which rests upon or indents the surface. Those that have light pressure on the central rod (less than about 200 grams) tend to follow the curvature of the uterine surface and emphasize the forward rotation of the uterus during contractions and show the so-called fundal dominance.

Those which flatten or indent the uterus tend to follow internal pressure. If the central rod is stiff and long and if it is fixed by local adhesive tape instead of a belt, it tends to measure the force necessary to lift the skin off the uterine wall!

The use of a belt, if too rigid, tends to prevent forward uterine rotation and the patient becomes conscious of contractions which would otherwise pass unnoticed. An elastic belt is the best compromise with a lightweight tocograph.

The amniotic pressure may be measured absolutely with great precision by a tocograph head consisting of a flat plate about 3 in. in diameter with a plunger of 1 in. diameter maintained level with the plate during all conditions of measurement. The flat plate forms a guard ring around the central measuring area and the flattened parietes are absolutely unable to affect the answer. Three thicknesses of blanket can be added without adverse effect! The device is self-calibrating and independent of skin thickness.

With all tocography the device measures the hydrostatic pressure within the uterus only if placed over a fluid-filled part. If placed over the fœtal back it measures the force to move the back, and the answer depends upon the stiffness of the fœtus and its supports, and bears no relation to the amniotic pressure.

[The foregoing contributors are attached to the Obstetric Unit, University College Hospital, and the Department of Pharmacology, University College, London.]

Mr. Arthur Williams (Guy's Hospital, London): In 1952 Mr. Stallworthy and I described a new method of recording uterine action whereby we made continuous and direct measurements of intra-uterine pressure right throughout labour. It is felt that external methods of recording are open to misinterpretation, for no one knows what precisely is being measured. Indeed Halliday and Heyns (1952) suggest that it is no more than a movement of the uterus. Bösch of Basel found external methods unreliable in comparison with an internal pressure record in a series of 50 cases. He says that very normal labours judged from a clinical viewpoint, and confirmed by a simple pressure record, when judged by external records often seem to be associated with "hypertonus and dysrhythmia." It may well be an explanation of the frequent incidence of hypertonus reported for example by Murphy in his large series.

However, our records show that normal labour has a characteristic pattern. When the uterus contracts the intra-uterine pressure rises, and the incompressible contents bulge at the point of least resistance. This is ordinarily the cervix. Substantially it is fibrous in structure, but elastic in property, and having been dilated in a first labour it offers less resistance on another occasion.

In some women this normal action is reduced. Contractions are infrequent and weak. This is frequently given a special name, "hypotonic inertia". It causes delay in labour, but provided that all concerned are patient it is rarely a danger to mother or babe. In other women uterine contractions are exaggerated so that strong contractions follow one another rapidly. This is exhausting to the patient, it may kill the babe *in utero*—but here again an anæsthetic or prompt delivery will avert the danger.

We believe that these three are really variations on a single theme of regular uterine rhythm.

We have made many records of abnormal labour. In this state the uterus is chiefly remarkable for erratic and unpredictable action. There is a dysrhythmia. This condition is often called hypertonic inertia, but we have not found elevated basal pressure a notable feature. There is frequently minor disproportion present, the cervix dilates slowly and painfully, if at all. The uterus may be excessively sensitive to Pitocin, minute amounts causing lasting spasm. We feel that if Pitocin is to be used in therapy, it should be by dilute infusion according to the recorded response of uterine muscle and fœtal heart rate. Since strong uterine contractions may cause fœtal anoxia, it is important to know what pressure prevents oxygen exchange across the placenta.

We have recorded a continuous pressure of 40–50 mm.Hg in a patient with hydramnios, but the fœtal heart beat at a normal rate. There was no evidence of fœtal anoxia. We have noticed that at pressures in excess of 80 mm.Hg fœtal anoxia occurs rapidly, and it seems that this should be regarded as the critical level.

I am only too conscious that in the analysis of inco-ordinate uterine activity none of our present-day techniques are particularly helpful.

I am aware that my remarks concerning external tocography are contrary to widely held opinions, but it may be that the external tocograph cannot distinguish between tonus and hardness. If our technique of recording intra-uterine pressures has anything to commend it, it is that it is safe and a measure of a physical quantity.

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Mr. M. P. Embrey (Radcliffe Infirmary, Oxford): A new multichannel "Hydroflex" external tocograph is described and characteristic records are demonstrated. Experiences with this instrument show that

(1) Temporary phases of inco-ordination are common in clinically normal labour and that it is consequently erroneous to judge uterine action from a short acquaintance.

(2) Multichannel recording in normal labour usually reveals mid-zone dominance and this method is not a satisfactory means of demonstrating the detailed pattern of uterine contractility.

(3) Because of the interposition of the parietes uterine tone cannot be accurately measured by an external tocograph.

Mr. W. J. Garrett (Radcliffe Infirmary, Oxford): Tocographic records show that in the intact human uterus dihydroergotamine has no demonstrable adrenaline-blocking activity [1] but rather does it possess strong direct oxytocic properties akin to ergotoxine and ergotamine. The dihydrogenated ergotoxine group alkaloids also share this oxytocic activity in varying degrees. By allotting arbitrary units, with dihydroergotamine as standard, the relative oxytocic power of the several alkaloids is expressed in the following table (Table I).

TABLE I.—APPROXIMATE QUANTITATIVE COMPARISON OF THE OXYTOCIC ACTIVITY OF THE SLOW-ACTING ERGOT ALKALOIDS WHEN GIVEN BY INTRAVENOUS INJECTION

Ergotamine [2]	2·0
Ergotoxine [2]	2·0
Dihydroergotamine [3]	**1·0**
Dihydroergotoxine (*syn.* dihydroergocornine) ..	1·0
Dihydroergocristine	0·2
Dihydroergokryptine	0·2
"Hydergine"*	0·4

*A mixture of equal parts *d.h.-ergotoxine*, *d.h.-ergocristine* and *d.h.-ergokryptine* marketed by Sandoz Products, Ltd.

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[*March* 25, 1955]

DISCUSSION ON THE USE OF KIELLAND'S FORCEPS

Mr. E. Parry-Jones: *Introduction.*—Kielland demonstrated his forceps for the first time in Norway in 1910. In 1915 he was invited by Professor Döderlein to his clinic in Munich and the following year he published his paper describing the forceps and their method of application.

The Norwegians did not adopt the forceps then nor have they done so since, but many of the German clinics accepted them with enthusiasm. They have become popular in this country only during the last ten to fifteen years.

Kielland introduced his instrument at a time when it was common practice to apply forceps to the high or floating head, often in the presence of disproportion. It is not surprising, therefore, that the impression gained ground that his forceps were designed solely for use under such conditions and that some obstetricians declared the instrument obsolete when the high forceps operation disappeared from obstetric practice. In fact, Kielland recognized the danger of high forceps delivery and the futility of his or any other pattern of instrument in the presence of disproportion at the brim. His writings and warnings passed unheeded, however, and the misuse of his forceps, with inevitably bad results,

was largely responsible for the reluctance manifested in this and other countries to accept Kielland's forceps in modern practice.

A fundamental difference between the obstetrics of to-day and that of Kielland's time is the great emphasis now laid on the head being engaged before vaginal delivery is undertaken. The problem *now* is whether these particular forceps offer advantages over others when it comes to delivering a head already engaged in the pelvis. This is a matter of considerable importance because despite the increased use of Cæsarean section the mid-forceps delivery is often still necessary and it can prove exceptionally difficult—sometimes when least expected.

Advantages of Kielland's forceps and their place in Modern Obstetrics.—The place of Kielland's forceps is primarily in the conduct of mid-forceps deliveries. Their advantages are that they permit an accurate cephalic application, irrespective of the position or station of the head. They provide a gentle and relatively simple method of rotation, without displacement or deflexion of the head. They enable traction to be exerted in the pelvic axis at all levels of the pelvis. Furthermore, only one application is necessary to complete delivery; excessive force is difficult to apply and intravaginal manipulation is reduced to a minimum.

Rotation with Kielland's forceps.—When forceps delivery is difficult there are two main reasons: (1) Unrecognized disproportion—a small pelvis or a large baby. (2) Malrotation of the head.

Kielland's forceps do not overcome disproportion but they do offer a neat and safe solution to the problem of the unrotated or malrotated head.

The most commonly employed method of rotation is by some form of manual manœuvre. This is generally recognized as the safest procedure and in the majority of cases is eminently satisfactory. Indeed some very experienced obstetricians claim that they have never failed to rotate the fœtal head by this method. Others find that in some cases manual rotation at the level of the arrest is difficult, and at times may be impossible. When such a situation arises, the operator may be tempted to displace the head above the pelvic brim when rotation is easy. This manœuvre can be successful but it involves two main risks:

(1) The umbilical cord may prolapse.

(2) It may be impossible to make the already moulded head re-engage in its new position. Indeed, it is contrary to the normal mechanism to expect the head to pass the brim with its occiput anterior. If the head does not enter the brim in its new position the situation becomes one of labour obstructed at the brim and the tragedies resulting from it are well known.

The fact that manual rotation can be difficult or impossible is borne out by the introduction of various other methods such as the Scanzoni and the Key-in-lock manœuvres and even the pelvic application of forceps. All of these involve risk to the fœtus or the mother or both, and they do not compare in either efficiency or safety with rotation by Kielland's forceps. Indeed those who have given Kielland's forceps a fair trial usually quickly reach the conclusion that the forceps offer facilities for a more artistic and scientific operation than manual rotation.

Kielland's forceps, however, demand experience if they are to be safe, and the operator must also be skilled in accurate diagnosis of disproportion and the exact position of the fœtal head: and how is experience to be gained? By using the forceps first on easy cases—those in which manual rotation would be easy, simple outlet extraction—in fact in the majority of cases in which there is an indication for forceps. In this way the operator develops the skill and experience essential to the case in which all other methods either fail or are contra-indicated. Only too often Kielland's forceps are kept in the cupboard until a really difficult case is encountered, and the operator then finds that they do not possess the magic qualities he has been led to expect.

The instrument is a beautiful one but its qualities are only displayed by those accustomed and skilled in its use (Figs. 1 and 2).

Some points in technique.—The forceps are particularly helpful in occipito-transverse and posterior positions and also in face presentations but space does not permit a full description of all the points in technique. For this reason only occipito-transverse position is considered.

Before the forceps are applied it is *essential* to make an accurate diagnosis of the position and station of the head and the size and shape of the pelvis. It is important also not to disturb the station of the head more than a minimal amount otherwise the risk of cord prolapse is increased and the well-flexed head may become deflexed and make delivery more difficult.

If, on examination, it is found that the sagittal suture lies antero-posteriorly or obliquely there is no problem. It is the application of the forceps to the head lying transversely which is the important matter. For this three methods are available: (1) Kielland's (Classical). (2) Wandering. (3) Direct.

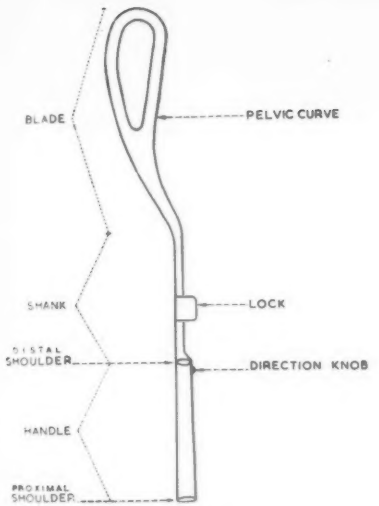


FIG. 1.

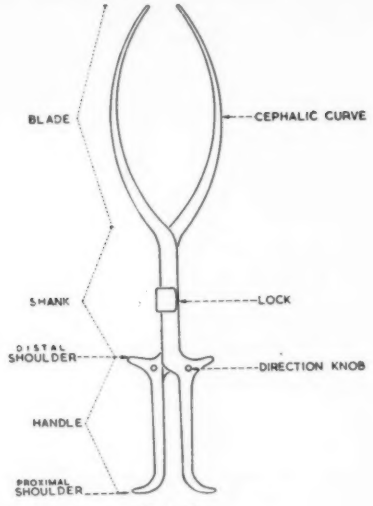


FIG. 2.

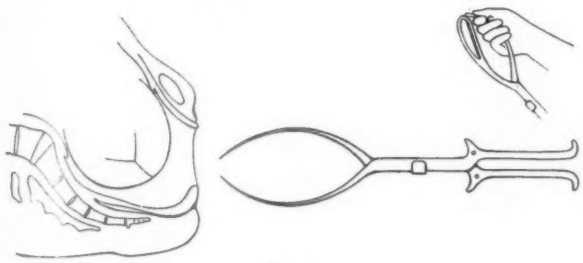
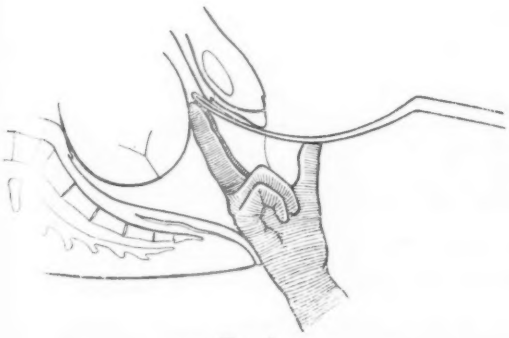


FIG. 3.

FIG. 5.



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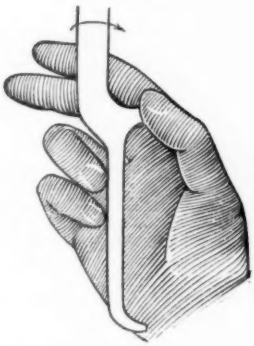

FIG. 6.

FIG. 1.—The forceps viewed from the side (one blade only).
FIG. 2.—The forceps viewed from above.
FIG. 3.—The head is in the right occipito-transverse position. The forceps are held before the vulva so that the direction knobs and lock point to the same side as the occiput. (*Inset*) The superior blade is chosen for insertion.
FIG. 4.—With the concavity of the cephalic curve pointing upwards, the tip of the blade is guided under the lip of the cervix by the internal fingers.
FIG. 5.—The position of the blade before rotation.
FIG. 6.—Grip for rotation in the right occipito-transverse position.

FIG. 7.

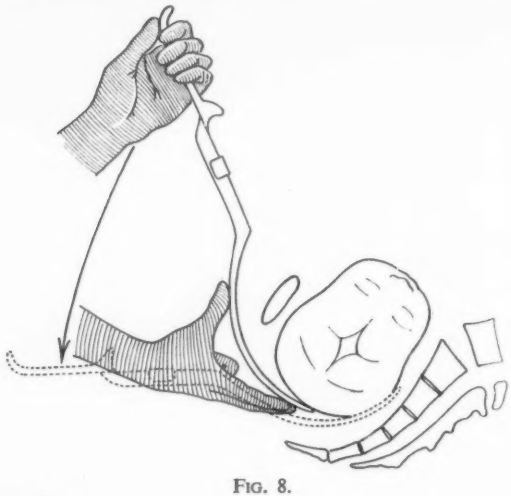

FIG. 8.

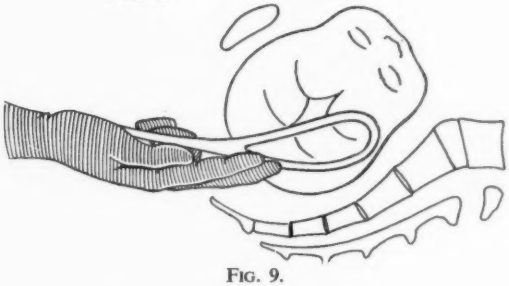

FIG. 9.

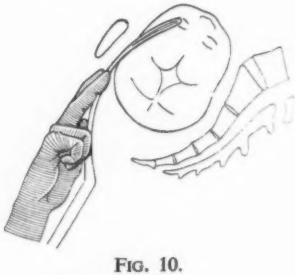

FIG. 10.

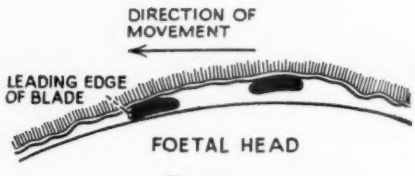

FIG. 11A.

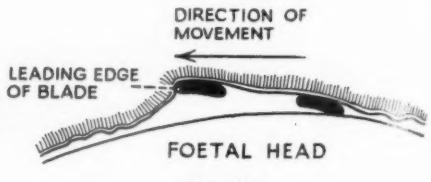

FIG. 11B.

FIG. 7.—The position of the blade after rotation.

FIG. 8.—First movement of wandering. Insertion of the blade. When the head is low and completely through the cervix the blade can be inserted under the guidance of two fingers.

FIG. 9.—Second movement of wandering. The internal fingers rest behind the fenestration, ready to push the blade anteriorly.

FIG. 10.—Third movement of wandering—the blade is being moved into position over the face or to the malar bone.

FIG. 11.—The leading edge of the blade presses more on the fœtal skull than on the vaginal wall. A. Correct. B. Incorrect.

With all these methods the *anterior* blade is applied *first*. This blade is determined by holding the forceps before the vulva in that position they will occupy when applied to the fœtal head (Fig. 3). The anterior blade is grasped and the posterior one replaced on the trolley.

(1) *Kielland's classical method.*—This involves inserting the anterior blade behind the symphysis pubis with the cephalic surface directed anteriorly. When inserted sufficiently far it is rotated gently through 180 degrees to lie in its correct position on the fœtal head. Rotation is made to that side to which the knob points (Figs. 4–7). The blade is allowed to follow any alteration of its position which occurs during rotation.

(2) *Wandering method.*—This consists of inserting the anterior blade in the postero-lateral region of the pelvis and sliding it in close proximity to the head so that it comes to lie anterior (Figs. 8–11).

(3) *Direct method.*—This method is used when the head is low and the tip of the blade can be inserted behind the symphysis with the cephalic surface on the head. When in this position behind the cervix the blade is lifted up and takes up its correct position (Figs. 12 and 13).

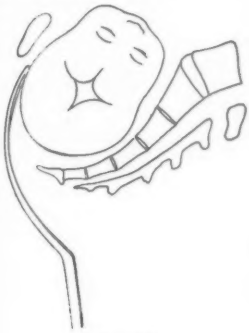

FIG. 12.—When the head is high and of normal size the blade cannot be introduced behind the symphysis.

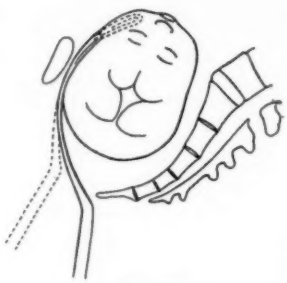

FIG. 13.—Elevation of the handle brings the blade into its correct position over the malar bone.

FIG. 12. FIG. 13.

If the head is high or the fit too tight this method cannot be used.

None of these methods should always be used, but rather the appropriate one chosen for the particular case. Much criticism has centred around the use of Kielland's classical method and there is no doubt that certain risks are associated with its indiscriminate use. It should *not* be used:

(i) When there is insufficient room behind the symphysis to allow the anterior blade to be inserted far enough to permit its subsequent rotation. A curved object can only pass through a hole which it fits exactly if it describes an arc of its own radius. Thus if the retropubic space is restricted the tip of the blade passes through an arc so small that it strikes the anterior uterine wall too near the symphysis thus making further introduction dangerous.

(ii) When the anterior shoulder lies just above the symphysis where it may interfere with rotation of the blade.

(iii) When the uterus is firmly contracted around the fœtus.

The Wandering method can be used in almost every case and is generally preferred. It suffers from the disadvantage that during the wandering of the blade the fœtal head may also move. If this occurs then the Classical method can be employed to advantage.

In all three methods the posterior blade is inserted in the same manner. It is introduced along the palmar aspect of the hand, the tips of the fingers lying within the cervical rim (Fig. 14). This latter point is particularly important if the cervix is not fully dilated or

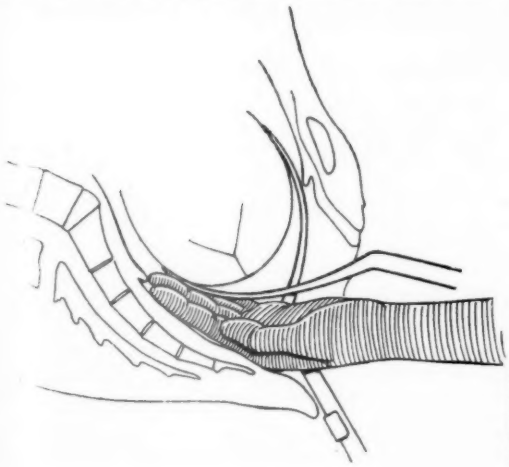

FIG. 14.—The anterior blade is in position. The fingers are just within the cervical rim and the tip of the blade is closely applied to the fœtal head. To make locking easy, the blade is inserted on the same side as the lock.

the head not deeply engaged in the pelvis. When the tip of the blade is within the cervical rim the forceps is introduced further to assume its correct position. In cases of difficulty it is easier to pass the blade to one side of the promontory and then gently to jockey it into position. If this fails then it suggests that the fit of the head in the pelvis is so tight that it may be wiser to abandon vaginal delivery.

Rotation of the head.—When the blades are in position, an attempt should be made to rotate the head *before* undertaking traction. If unsuccessful, traction is then made in the line of the handles and after descent, rotation is tried again. In this way the easiest position for rotation is found. Occasionally it may be necessary to bring the moulded head almost to the vulva in the transverse position before rotation can be completed.

The grip of the forceps for rotation should be with 3 fingers only and force is never used (Fig. 15). It is permissible to elevate or depress the blades slightly as sometimes rotation is thus made easier.

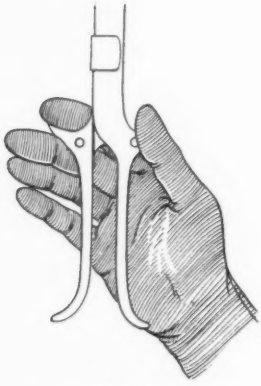

FIG. 15.

FIG. 16.

FIG. 15.—The grip of the handle in the right occipito-posterior or transverse position.

FIG. 16.—The grip to be used for traction. The index and middle fingers rest on the shoulders. The palm of the hand should not touch the handle.

Traction.—Traction is *always* made in the line of the handles as in this way the forceps act as an axis-traction instrument. Only 2 fingers should be employed thus avoiding excessive traction, because the operator's fingers become too painful for a really prolonged pull (Fig. 16).

The handles should not be squeezed otherwise the head will be compressed.

Rotation and traction should *never* be carried out together although spontaneous rotation during traction should not be hindered.

Dangers of Kielland's forceps.—Maternal: Almost every possible obstetrical complication has been reported following the use of Kielland's forceps and this is true of all patterns of forceps. There are only 3 special risks peculiar to the forceps: (*a*) Injury to the bladder and/or urethra. (*b*) Third degree tear. (*c*) Rupture of the lower segment.

Hæmaturia is more likely to occur in just those cases where Kielland's forceps are most useful, namely when the fœtal head is firmly fixed in the transverse position. Under these circumstances the bladder wall is subject to considerable pressure and during delivery the forceps may aggravate the process already started by the head. There is a possibility that the injury to the bladder may lead to fistula formation but this risk can be reduced considerably if not completely avoided, by the use of continuous bladder drainage whenever hæmaturia is discovered on routine catheterization after delivery.

Tearing of the urethra is usually associated with injury to the anterior vaginal wall and is always caused by unskilful and forceful rotation in the face of resistance.

Third degree tear may occur if an episiotomy is not performed *before* the forceps are applied, particularly if the head is high. In this position the shank of the forceps presses firmly against the perineum and may tear it completely.

Rupture of the lower uterine segment nearly always means a gross error in diagnosis or technique and is avoidable.

Fœtal: Apart from abrasions of the face at the site of the tips of the blades there is no injury characteristic of the forceps. Indeed the accurate cephalic grip protects the fœtus.

Results: The following results represent the combined figures for the Liverpool and St. Asaph Maternity Hospitals. The author's results whilst at these two hospitals are also given and are included in the total figures.

	Number of cases	Maternal deaths	Stillbirths	Neonatal deaths	Fœtal mortality Gross %	Fœtal mortality Corrected %
Hospital Series						
1933–1949 L. M. H.*	258	0	7 (4)	10 (9)	6·6	5·0
1952–1955 St. A. M. H.	97	0	3 [1,2,3] (1)	2 [4,5] (2)	5·2	3·1
	355	0	10 (5)	12 (11)	6·2	4·5
Personal Series						
1948–1950 L. M. H.*	60	0	2 (1)	2 (1)	6·7	3·3
1952–1955 St. A. M. H.	45	0	2 [1,3] (0)	0	4·4	0
	105	0	4 (1)	2 (1)	5·7	1·9

Stillbirths
[1]Iniencephalic
[2]Asphyxia (prolapsed cord)
[3]Hydrocephalic

Neonatal deaths
[4]Atelectasis
[5]Intracranial injury (no P.M.)

St. Asaph Hospital Series
Fistulæ 0
Hæmaturia 3
3rd degree tear (following version) 1

*E. Parry-Jones (1952) Kielland's Forceps. London; pp. 148, 155.

Out of the 97 cases in which Kielland's forceps were used at St. Asaph there were 5 foetal deaths, 3 of which occurred in cases where the forceps failed to effect delivery.

Failed Kielland's Forceps

Nature of failure	Possible cause	Weight in pounds	Final method of delivery	Result
Application	Large baby	9·4	Classical forceps	(Prolapsed cord) S.B.
,,	,,	10·2	,,	A
Rotation	Crushed hydrocephalic	?	Version	S.B.
Trial of forceps	Cervix not fully dilated	6·12	C.S.	A
,, ,,	,,	9·1	C.S.	A
,, ,,	,,	8·1	C.S.	S.B. (Atelectasis).

Many hard things have been said of Kielland's forceps but the results following their use are certainly no worse and may be even better than those of the more orthodox methods, especially when it is remembered that the forceps are generally used on the more difficult cases.

In conclusion it should be emphasized that the forceps do not possess any magic properties. Their successful use is in no way associated with luck but with the employment of gentleness and a clear appreciation of the mechanical principles which are at play during the whole operation of vaginal delivery.

[All diagrams from "Kielland's Forceps", E. Parry-Jones, by courtesy of Messrs. Butterworth & Co. (Publishers) Ltd., London.]

Mr. Alistair Gunn: Kielland has made a contribution to obstetrics comparable with those of Chamberlen, Smellie and Tarnier. His contribution is a double one—the forceps themselves and the exact instructions for their use.

I have been using Kielland's forceps since 1931 when Kielland himself demonstrated them to us in London. During these twenty-four years not only have I depended on the forceps for rotating posterior positions of the occiput and arrest of the occiput in the transverse diameter, but I have pursued a policy of also using the forceps in anterior positions, applying them then by the direct method.

Kielland's forceps should not be used by anyone who has not taken the considerable trouble needed to learn how they should be employed. This involves learning the drill

by heart, practising on the model with the blades hidden from view, re-reading Kielland's instructions at frequent intervals and, on the first two or three occasions of actual use, having an instructor present. The details can be read in Parry-Jones's book (1952) or in the 3rd edition of Bourne and Williams's "Recent Advances in Obstetrics and Gynæcology", published in 1932.

There are three methods of applying the blades: the Classical, the Wandering and the Direct. It is the classical method originally described by Kielland himself that I and my pupils use.

I have looked out the records of forceps deliveries at those of my hospitals which have consistently published clinical reports. These extend from 1933 at Croydon to a post-war series at Bromley ending in 1952. All the Kielland's deliveries were done by me from 1933 to 1948 and since 1949 they have been done either by myself or by those of my assistants who have taken the trouble to learn to use the instruments. These have been Bruce Eton, J. L. Warren, I. Rocker, D. B. Allbrook and P. R. Harben.

I have not included the work of the larger departments of my other hospitals although some of my old assistants, including J. Friedlander of Cape Town, became experts in the use of the forceps by the classical method.

Table I (not reproduced in these *Proceedings*) gives a summary of the cases under review. The 186 cases might be described as the worst labours of 14,117 deliveries and there are no omissions. There were no maternal deaths amongst the 186. The fœtal losses number 21 which is 11½%. The same 14,117 cases yielded 604 other forceps deliveries (anterior vertices) with 1 maternal death and 51 babies lost, a fœtal mortality of 8½%. Fœtal mortality in forceps cases up and down the country varies between 6 and 12%. Our losses seem to be high but when they are set against the very low forceps rate the reason will be clear.

It will be noticed that in 5,386 deliveries before 1940 the Cæsarean section rate was just over 1% whereas in 8,731 from 1946–1952 it was 2½%. The forceps rate in both periods was 5½%.

At this juncture I would like to point out how misleading it can be to compare figures relating to one aspect of any work without knowing all the circumstances. There are two reasons which spring to mind. First, different people report their cases in different ways. We must remember that in 1953 in England and Wales stillbirths numbered 22·5 per 1,000 and neo-natal deaths 17·7 per 1,000, totalling just over 40 per 1,000, the lowest ever recorded. Rucker in 1939 reported 2,251 cases of Kielland's forceps delivery with a gross fœtal loss rate of 35 per 1,000 which is considerably lower than the present combined fœtal loss rate for England and Wales (1953)! Of these, 444 were rotation cases, a complication occurring less than 50 times in every 1,000 cases, and so they must have been culled from at least 9,000 deliveries! Jauch (1950) described 500 cases with gross fœtal losses of 17 (34 per thousand)! Some of the reporters show a gross fœtal loss rate of 14 or less and even 0 per 1,000.

It is a contrast to recall that Munro Kerr in 1933 described a short series of 39 cases with 10 stillbirths and neo-natal deaths, equivalent to 256 per 1,000. It is evident that reporting is not done by all on the same lines.

The second difference may be in the work itself. A high Cæsarean section rate may include many of the cases which otherwise are likely to require forceps delivery.

It will be noticed that at Bromley Hospital we have a low forceps rate and a low incidence of forceps intervention for posterior positions. For this there are at least two reasons. One is that nearly every patient has episiotomy done under local anæsthesia and this sometimes leads to an unassisted delivery in a patient who would otherwise require help with forceps.

Another reason is that we appreciate that the rotation of a posterior position takes place late in the second stage and so we postpone giving instrumental help to patients who are making progress and are not in distress.

The result is that at Bromley many of the easy forceps deliveries are avoided, more of the posterior positions rotate spontaneously and the residue of forceps cases are the serious ones with a higher percentage of fœtal losses.

We can quickly look through the cases, numbering 186, shown in full in Table II (not reproduced in these *Proceedings*). In each case I give the reference number, age, parity, maturity, the indication for interference, durations of the first and second stages of labour, weight of the baby, result to mother and child, and the name of the operator. I will comment on each of the 21 cases in which the baby was lost.

Starting with the 33 Kielland's rotation cases at Croydon over twenty years ago, we notice the long second stages which many patients suffered in those days. Patient No. 3 was 3½ hours in the second stage of labour and her baby was stillborn. No. 14 was a patient with heart failure, who had previously had easy deliveries. Maternal cyanosis killed her baby. No. 26 was six days in labour and over 4 hours in the second stage. Nowadays

Cæsarean section would have prevented this terrible labour, and the same applies to Nos. 28 and 32.

The Bromley pre-war cases gave one baby death, No. 36, which was the result of efforts to deliver the baby at home, before she came into our hospital.

Bromley post-war cases start with a stillbirth, No. 46, in which the baby died during a long first stage. There is a death (No. 48) of a baby aged 12 days from staphylococcal infection, and then there was No. 62, a multipara, whose baby had hydrocephalus.

When we reach 1947, in Case No. 68 the mother had eclampsia and the baby weighing 4 lb. 15 oz., died. In Case No. 69 we failed to deliver the baby in time, when it had shown distress *in utero*. In 1948 you notice that my assistants are beginning to accept responsibility. Number 81 was a tragic case of inertia, which to-day would be treated by Cæsarean section after twenty or thirty hours in labour at the most. The first stage lasted nearly three days, and I did not feel that I could deliver the baby until she had been in the second stage for four hours. A vesico-vaginal fistula resulted and I repaired it three months later. The mother had another baby four years later in Westminster Hospital, delivered by Cæsarean section. The next stillbirth, No. 82, could not be explained by the clinical course or by the post-mortem findings.

Early in 1949 there were two difficult deliveries (Nos. 104 and 106) with stillborn babies, and then a second twin, No. 115, which did not live after a long second stage.

Twin labour we know to carry its own risk and 1950 gave a patient, No. 129, who had a first twin which was macerated, dead long before delivery. It was followed by a stillbirth (No. 132) in which the fœtal heart sounds disappeared at the end of the first stage. In 1951, No. 149 was a dreadful case in which the mother had a large pulmonary embolism early in labour and herself was in an oxygen tent before and after the forceps anæsthesia. We were fortunate not to lose the mother too.

The Tables for the work since 1950 show that the second stages have become shorter. One more infant death (No. 150) was a twin weighing 3 lb. 11 oz.

Finally in 1952 we had a stillbirth (No. 176) occurring after prolonged labour; the result proves that we should have resorted to Cæsarean section.

The 21 fœtal losses from 186 Kielland's rotation cases, the worst of over 14,000 deliveries, are seen to derive from 9 long labours which, in the event, would have been better avoided by performing Cæsarean section early in labour; 3 other labours in which the fœtus died before the instrumental delivery was begun; 8 cases in which the loss of the baby was due to other unconnected complications, and one case of "Failed forceps" before admission. There was no maternal death.

I propose to discuss figures from 5 hospitals (Table III) which I know will give obstetricians a more comprehensive view of their work, and which illustrate the importance of difficult forceps deliveries in the work of these hospitals. From the published reports, it is clear Kielland's forceps were not regularly used in any of these hospitals except Bromley.

I have selected St. Mary's Manchester "Booked" and Cheshire cases 1946–1947 numbering nearly 6,000, Glasgow Royal Maternity and Women's Hospital 1948–1952 over 10,000 Booked cases, Queen Charlotte's Hospital 1947–1952, 16,500 cases, Guy's Hospital 1946–1952, 8,000 cases, and Bromley Hospital 1946–1952 nearly 9,000. For the last three hospitals all cases, whether Booked or Non-booked, are included. The maternal death-rates vary from less than one to just over 2 per 1,000 live births, although it is only fair to add that the years 1946 and 1947 gave a much greater number of deaths, probably because both the patients and staff had not settled down after the recent war. The stillbirths are seen to vary from 47 to 23 per 1,000 live and stillbirths, while the neo-natal deaths approximate more closely between the figures of 19 and 10 per 1,000 live births.

The Cæsarean sections at Glasgow and Manchester numbered about 5% of all deliveries, while at Queen Charlotte's Hospital they were only 3·8%. At Guy's Hospital and Bromley Hospital they formed only 2½% of the whole. Forceps deliveries were fewer (7% of all deliveries) at Guy's Hospital than at the first three (9½ to 11%) and very much less at Bromley Hospital (5½%). Two reasons for this difference have already been given and the consequent concentration of the worst cases in this 5½% residue has been emphasized by the relatively high fœtal mortality after forceps delivery. This must be borne in mind when we examine the next columns which show the cases of forceps delivery of occipito-posterior positions and transverse arrest of the occiput. There were 259 cases at Manchester and 439 at Glasgow, an exactly similar incidence of 43 per 1,000 deliveries. Queen Charlotte's Hospital's 527 cases represented 32 per 1,000 deliveries, Guy's Hospital had 20 per 1,000 and Bromley 23 per 1,000. The Bromley cases consisted of 141 in which Kielland's rotation was done and 60 other simple cases in which forceps delivery was done after manual rotation or unrotated. There is an appreciable maternal mortality in three of the hospitals but none at Queen Charlotte's and Bromley. The fœtal losses in these posterior cases per thousand

TABLE III.—THE INCIDENCE OF INSTRUMENTAL DELIVERY, &C., IN SELECTED HOSPITALS, SHOWING MORTALITY IN POSTERIOR POSITIONS OF VERTEX

Hospital and years	No. of deliveries	Maternal mortality per 1,000	S.B. per 1,000	NND. per 1,000	C.S. %	Forceps %	Occipito-posterior and transverse arrest delivered by forceps						Other forceps deliveries			
							Cases	Incidence per 1,000 deliveries	MD.	SB.	NND.	Fœtal loss per 1,000 deliveries	Cases	SB.	NND.	Fœtal loss per 1,000
St. Mary's Manchester "Booked" and Cheshire 1946–47	5,932	1·7	47	19	4·7	11	259	43	2	19	10	5	408 (No MD) 69/1,000	24	5	5
Glasgow Royal Maternity and Women's Hosp. 1948–52 Booked only	10,137	2·2	42	19	5	9½	439	43	3	25	10	3·5	551 (2 MD) 54/1,000	35	7	4
Q.C.H. 1947–52 Booked and Non-booked	16,564	0·9	28	18	3·8	11	527	32	0	18	7	1·5	1,324 (1 MD) 80/1,000	54	21	4·5
Guy's Hosp. 1946–52 Classes A and B	8,019	1·5	25	15	2½	7	162	20	2	10	1	1·4	413 (1 MD) 51/1,000	18	4	2·7
Bromley 1946–52 Booked and Non-booked	8,731	0·6	23	10	2½	5½	Kielland's 141	16	0	11	4	1·7	285 (1 MD) 32/1,000	19	3	2·5
							Others 60	7	0	1	0	0·1				

SB. = Stillbirths. NND. = Neonatal deaths. MD. = Maternal deaths. C.S. = Caesarean section.

total deliveries are 5 at Manchester, 3·5 at Glasgow, 1·5 at Queen Charlotte's Hospital, 1·4 at Guy's Hospital and 1·8 at Bromley.

To complete the picture we must include the remaining forceps deliveries, and show how many babies are lost in the anterior positions per 1,000 deliveries. This enables us to see that at Manchester in 1946–1947 10 babies were lost after forceps delivery for every 1,000 total deliveries, at Glasgow from 1948 to 1952 7·5 fœtal deaths in forceps cases resulted from every 1,000 deliveries, at Queen Charlotte's Hospital from 1947 to 1952 the corresponding figure was 6, at Guy's Hospital it was 4·1, and at Bromley Hospital it was 4·3.

The figures are not intended to show that the results are better than those of other hospitals because there are other factors which cannot be assessed numerically. They do give an accurate account of the work and I might venture the opinion that the resultant losses of mothers and babies do not compare unfavourably with those of the leading hospitals in this country.

I think this might be an appropriate time to demonstrate the use of Kielland's forceps in a case of transverse arrest of the occipito-posterior positions by means of a film. The film is intended for teaching junior post-graduates and so I am dogmatic on some elementary points.

The film entitled "Kielland's Midwifery Forceps" is in colour and accompanied by a commentary in sound. It describes the forceps and demonstrates how they are applied to the fœtal head. The careful and exact diagnosis of the position of the occiput by abdominal and pelvic examination was emphasized by Kielland and the methods of examination are depicted at some length. The delivery of an emergency case with labour delayed owing to arrest of the head in the transverse diameter is demonstrated. The forceps are applied by Kielland's classical method.

I am indebted to the staff of the Maternity Department of Lewisham Hospital and the management committee for making the film and to Dr. Ronald Mac Keith for advice on medical filming.

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In the Discussion which followed, Mr. Leslie Williams, Professor Chassar Moir, Professor W. I. C. Morris, Mr. J. V. O'Sullivan, Mr. H. J. Malkin, Mr. W. G. Mills, the President and Professor F. J. Browne took part.

Mr. **Alistair Gunn** in reply to some questions, said that the Tables were not intended to include face presentations unless they were converted to occipito-posterior position or transverse arrest of the occiput before delivery.

The subject of fistula was only introduced in a conversation about Kielland's forceps by those who were not really schooled in Kielland's own technique. If one set out to make a hole between the vagina and the bladder with one of these beautiful blades it would prove to be difficult or well-nigh impossible.

The exact and gentle application with the toe of the forceps creeping up in close contact with the fœtus made any tearing impossible. Rotation of the anterior blade and rotation of the head were done in a tentative mood. It should be noted that the lever of the rotating instrument is exactly $1\frac{3}{8}$ in. long.

In the 8,731 patients reviewed for 1946–1952 there had been 3 cases of fistula in the labours under consideration. Mr. Gunn had dealt with about 12 other patients who had presented themselves with fistulæ incurred in other hands using orthodox English forceps. In nearly every case fistula had been associated with long labour.

When he was in South Africa he attended the McCord Hospital where Dr. Taylor operated on 2 or 3 cases of vesico-vaginal fistula every week. There were hundreds of these cases to be treated. Their story was not one of instrumental delivery but of prolonged or obstructed labour, often so prolonged that their lives were saved by the fœtus dying and being delivered after maceration had reduced its bulk.

One of his patients, No. 81 (to whom he had already referred) was $73\frac{1}{2}$ hours in labour and another, No. 135, was over 58 hours. The third case, No. 140, had attempts made at manual rotation before admission and these had failed. His Registrar rotated the head with Kielland's forceps and then delivered without difficulty. The patient developed left uretero-vaginal fistula which healed spontaneously.

He could not avoid referring to eminent obstetricians who insist on examination candidates

and other obstetricians inserting the whole hand into the vagina to carry out rotation, and again later to confirm that the forceps are correctly applied over the ears of the fœtus. He had not been discussing this class of case, in fact such cases do not cause any difficulty. In the patients with whom he was concerned, the hand could not be introduced into the vagina without displacing the head above the brim, thereby losing the hard-won ground; and after the forceps had been applied to the head there was insufficient room to insert one finger, far less the whole hand.

Finally he would like to emphasize that the occasional use of Kielland's forceps with its inevitable departure from Kielland's own method must result in bad work; and he would, in all seriousness, advise an obstetrician who might use them in this way to take them home and use them for putting coal on the fire.

Abdominal Total Hysterectomy

A New Technique: The Posterior Approach [*Résumé*]

By Frank Musgrove, F.R.C.S.

Beginning with the standard procedure of total hysterectomy four fundamental steps were described.

(1) Ligation of the utero-sacral ligaments.

(2) Fashioning of a posterior peritoneal flap, and opening the posterior vaginal vault with a diathermy knife.

(3) Downward dissection of the bladder under direct vision, using a finger in the vaginal vault as a marker and guide.

(4) Closure of the vaginal vault by using the utero-sacral ligament ligatures.

The advantages of the new technique are:

(1) The operation is undertaken working from behind forwards; thus the ureters and bladder are clearly seen throughout and injury to these structures is reduced to a minimum.

(2) Vaginal vault prolapse cannot occur since the vault is permanently supported by the utero-sacral ligaments, which are once more reunited with the respective cardinal ligaments.

(3) Use of the newly designed vaginal angle clamps greatly facilitates the closure of the vaginal vault.

(4) Post-operative shortening of the vagina does not occur, and vaginal vault granulations are rarely seen.

Section of Urology

President—VICTOR W. DIX, F.R.C.S.

[*January* 27, 1955]

Spontaneous Rupture of the Urinary Bladder

By C. L. O. MACALISTER, M.B., F.R.C.S.Ed. (*Bradford*)

RUPTURE of the urinary bladder is usually traumatic in origin due to penetrating from without, perurethral manipulations from within, or violence applied to the abdominal wall with or without accompanying fracture of the pelvis. When there is no such history of external stimulation the rupture is described as spontaneous, even though the precipitating cause may be intense straining by the individual to micturate, defæcate, or lift a heavy weight.

The empty bladder is well protected in the true pelvis but as it distends it rises upwards into the abdomen, so becoming much more vulnerable. Expansion of the base is limited by the bony pelvis with its lining of muscles, and it is firmly anchored by the prostate with the pubo-prostatic ligaments anteriorly and by the hypogastric alæ posteriorly. The anterior wall is protected from over-distension by the attachment of the urachus to the abdominal wall. The main strain of distension is, therefore, exerted on the postero-superior peritonealized segment which is not only developmentally weakest but has only intestine as support. This is the usual site of rupture following indirect violence, as well as in spontaneous rupture secondary to infravesical obstruction.

Any conditions which impair the normal elasticity of the bladder predispose to rupture. The commonest of these is over-distension. Usually, however, there is some concomitant abnormality of the bladder. This may occur primarily in the wall itself, e.g. inflammation, ulceration, or fibrosis such as occurs in tuberculosis, fatty degeneration or malignant infiltration. On the other hand, the wall may be involved secondarily to infravesical obstruction in the prostate or urethra. Neurogenic dysfunction is a rare cause unless one classifies alcoholism in this category. Although most reported cases have occurred in males, the female bladder is not immune, especially during pregnancy and labour.

Case I.—Male, aged 60, was admitted to hospital with dull suprapubic and perineal pain of eight hours' duration associated with extreme dysuria, only small amounts of blood-stained urine being passed at a time. Until then he had suffered from no urinary symptoms apart from hæmaturia on one occasion six months before.

His general condition was excellent and he did not appear distressed. Abdominal examination showed a diffuse tender suprapubic mass rising out of the pelvis suggestive of a distended bladder though lacking the usual firm well-defined outline. The prostate was not enlarged on rectal examination but bimanual examination confirmed the presence of a vague mass in the bladder region. Pelvic examination was otherwise normal.

A Foley catheter was easily introduced, producing about 10 oz. of blood-stained urine. The patient at once felt relieved. Bimanual examination still, however, demonstrated a pelvic mass.

During the next few hours, only a little blood-stained urine drained from the catheter and the abdominal and perineal pain returned. It was obvious, then, that this was not a simple acute retention of urine.

Cystoscopy was carried out but bleeding prevented satisfactory visualization. A papilloma was noted on the left lateral wall and the orifice of a diverticulum on the right. The tear was not seen.

Since this investigation did not explain the pelvic mass an ascending cysto-urethrogram was done using 200 ml. of 3% diodone (Fig. 1) which demonstrated rupture of the bladder.

During subsequent induction of anæsthesia for operation he regurgitated stomach contents into his lungs and despite bronchoscopic suction died a few hours later.

Post-mortem examination showed a vertical linear tear on the postero-superior surface of the bladder with extravasation of urine. The peritoneum was intact. The bladder at the site of rupture was very thin with inflammation of the mucosa and fibrous replacement of the musculature. On the left lateral wall just above the ureteric orifice was a papilloma about 3 in. long with a small base and attenuated body which could be manipulated into the bladder neck itself. A diverticulum was present above and medial to the right ureteric orifice. No bladder-neck obstruction was noted.

This was a case of spontaneous extraperitoneal rupture of the bladder due to straining to micturate during acute retention from blockage of the bladder neck by a papilloma.

Case II.—Male, aged 51, was admitted to a general surgical ward for repair of an umbilical hernia and a direct inguinal hernia. His general health was excellent and he had no previous urinary symptoms.

The herniæ were repaired uneventfully. That evening he tried to pass urine for the first time after operation but could not do so. He complained of abdominal pain then, and was given morphia ¼ grain. By next morning no urine had been passed and he was in considerable discomfort.

Morphia ¼ grain was again administered followed by 1 ml. carbachol. In attempting micturition thereafter, he experienced sudden severe lower abdominal pain and a few drops of blood were voided. He then appeared somewhat shocked. A soft rubber catheter was passed but only a little blood drained away despite repeated washouts. His general condition improved over the next few hours although it was noted in his case records that continuing abdominal pain necessitated a further injection of 100 mg. pethidine. Only a little blood drained from the catheter and his condition again deteriorated. When examined at this time his appearance suggested an internal hæmorrhage. Abdominal palpation showed acute suprapubic tenderness with rigidity of the abdominal wall but assessment was difficult because of the recent wounds. Rectal examination showed great tenderness over the bladder base and pouch of Douglas. Bimanual palpation of the pelvis was inconclusive because of extreme tenderness.

Blood transfusion was started and as soon as his general condition permitted the retropubic space was explored by a mid-line incision. The bladder was deeply congested and empty but no urine was present extraperitoneally. The peritoneum was opened and about 2 pints of blood-stained fluid aspirated. A vertical 3 in. tear was present on the postero-superior aspect involving all the layers of the bladder wall and the peritoneum. This was sutured in one layer, a F36 Pezzer tube was inserted into the bladder just below the peritoneal reflection. The peritoneum was closed and the retropubic space drained. Post-operatively his condition did not improve and he died twelve hours afterwards.

Post-mortem examination confirmed the operative findings. No bladder-neck obstruction was present and the bladder wall was normal.

This was a spontaneous intraperitoneal rupture following reflex post-operative retention of urine. The precipitating factors here were the increased intra-abdominal pressure from straining and the direct stimulant effect of carbachol.

Symptoms.—These two cases illustrate the classical symptoms of bladder rupture. Intraperitoneal rupture usually presents as an acute abdominal emergency with sudden onset of suprapubic pain and rigidity associated with shock. The site of the pain is dependent to some extent on the position of the patient at the time of rupture. When he is erect or sitting it is primarily suprapubic whereas if he is lying it may be initially epigastric. Attention is drawn to the bladder as the site of the lesion by inability to void or dysuria with the passage of small amounts of blood-stained urine.

Extraperitoneal rupture is a more insidious process, the patient does not appear ill until the later stages, pain is less acute and radiates from the suprapubic region to the perineum. A vague mass is palpable in the lower abdomen due to infiltration of the perivesical tissues. At first sight the appearances suggest acute retention of urine and it may be treated as such initially.

Diagnosis.—Although, in intraperitoneal rupture, exploration of the abdomen for peritonitis may be necessary before a diagnosis can be made, in most cases the patient's condition permits further investigation to aid in establishing a positive diagnosis.

(1) *Passage of a catheter* with introduction of a measured quantity of fluid into the bladder and estimation of the amount recovered through the catheter, is time-honoured but fallacious. The tear may be blocked by clot or omentum so little leakage may occur. The catheter itself may block with clot in the absence of rupture and only a portion of the injected fluid return. The catheter may traverse the rent and drain the extravasated area so that more fluid is got back than was injected. This last observation is in fact of more diagnostic value than the test as originally described.

(2) *Cystoscopy* should be the best method of diagnosis but continuous bleeding may obscure vision or the tear may be so large as to prevent adequate distension of the bladder. It also requires a good deal of manipulation which is obviously unwise in these cases.

(3) *Intravenous pyelography* is time-consuming. Considerable delay may be necessary before an adequate cystogram is obtained and if there is much leakage of the medium into the extravasation only a poor cystogram will result. In a shocked patient impaired renal function from hypotension will render the investigation useless. A normal descending cystogram does not necessarily exclude rupture (Fig. 2). In this case exploration, because of persistent pain, demonstrated an intraperitoneal rupture of the bladder sealed almost completely by omentum.

(4) *Retrograde cystogram or cysto-urethrogram* is the most satisfactory radiological aid. Antero-posterior views should be taken first, and only if they are inconclusive should oblique views be taken. There is little danger if the medium extravasates since operative drainage

FIG. 1.—*Case I.* Extraperitoneal rupture of the bladder showing the extravasation "tenting" the peritoneum over the bladder. Diverticulum on the right side.

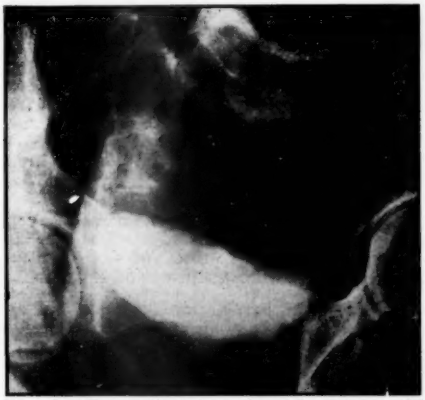

FIG. 2.—Traumatic intraperitoneal rupture, with normal descending cystogram.

FIG. 3.—Traumatic intraperitoneal rupture of the bladder outlining haustrations of cæcum and colon.

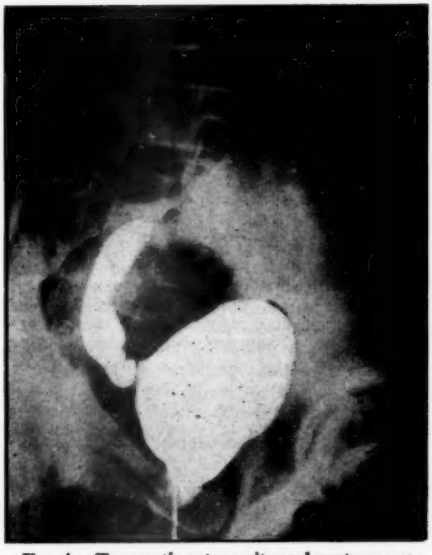

FIG. 4.—Traumatic extraperitoneal rupture cystogram with reflux up right ureter from tuberculous bladder, but no extravasation obvious.

automatically follows (Figs. 1 and 3). Again, a normal cystogram does not exclude rupture (Fig. 4). In this case extraperitoneal rupture of a tuberculous bladder, during cystoscopy, was demonstrated when operation was carried out because of persistent suprapubic pain.

Treatment.—Immediate operation is imperative as soon as the patient has been made fit by supportive therapy. The bladder should be drained by cystotomy and not by urethral catheter alone. The tear should be sutured when accessible although many consider this step unnecessary. The peritoneal cavity need not be drained but the perivesical fascial spaces must be drained thoroughly.

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Mr. R. H. O. B. Robinson said that he could recall the case of a woman who was in hospital for four days with unsuspected rupture of the bladder. No one had seemed to notice that she was not passing very much water, and rupture of the bladder was not thought of, because she complained of persistent *epigastric* pain, which paradoxically is the usual situation for the pain to be felt.

Mr. L. N. Pyrah said that he had had two cases of spontaneous rupture of the bladder. One of these was in a woman who had had a recent confinement which was followed by urinary retention. She was treated by catheterization for ten days in her own home and the bladder became grossly infected. On the eleventh evening, when the bladder was full and she was awaiting catheterization, she developed an excruciating abdominal pain. When he saw her there was diffuse abdominal rigidity and the picture was that of a perforated viscus. Operation was performed and a biggish intraperitoneal rupture of the bladder was successfully repaired. The bladder itself was the seat of intense purulent and membranous cystitis.

The other patient had had cystodiathermy for a rather large papilloma of the bladder in hospital. On the fifth day he suddenly developed abdominal pain and there was widespread abdominal rigidity. A diagnosis of ruptured bladder was made. The abdomen was opened and again an intraperitoneal rupture of the bladder was found and sutured. The bladder wall in this case was much thinner than the average bladder, which may have accounted for the spontaneous rupture of the bladder muscle.

Mr. J. Cosbie Ross said that there was undoubtedly a connexion between alcohol and rupture of the bladder. He recalled two instances of inebriated women who had been perhaps roughly handled and both of them had intraperitoneal rupture of the bladder. Not all these cases presented unequivocal signs of perforation. Some of them appeared in quite an ambiguous way, with signs and symptoms which were not very dramatic. It was probable that alcohol had an effect on the threshold of pain, and neither of the cases he had mentioned was very distressed. There were records of patients in whom urine had been present in the peritoneal cavity for eight days without very much disturbance. A very dramatic onset in these cases must not necessarily be expected.

Mr. David Band said that in Scotland they were accustomed to have courses in forensic medicine, and he well recalled his professor being most emphatic that no distended bladder would rupture unless subject to violence which was either criminal or accidental trauma. He would, however, add to these such ruptures as Mr. Pyrah had indicated and particularly rupture occurring after severe endoscopic diathermy. He felt that this term "spontaneous rupture of the bladder" might be fallacious. There was always an underlying pathological lesion or some form of trauma of a severe nature.

Mr. B. H. Page mentioned a case in which the bladder wall had ruptured intraperitoneally at the point at which the tip of an indwelling catheter had lain in contact with it for two or three days.

Mr. E. W. Riches said that he was about to claim that he had never seen a case of spontaneous rupture of the bladder, as Mr. Macalister had defined it, but if cases due to injury were included then he had seen it. He had twice seen a bladder rupture after diathermy for a growth, but in both these cases what had happened had been quite apparent at the time or very soon after the operation, certainly within two days. He would feel perfectly safe, from that point of view, in sending patients out after two days. He had seen one case occur after a too energetic biopsy done with a wrong instrument. He also raised a point with regard to carbachol. It was a most useful thing in post-operative retention, but he wondered whether they were quite wise in using it as freely as they did.

Mr. H. G. Hanley referred to a case of perforated bladder—a tuberculous case—which subsequently died of peritonitis. That case was one in which the abdomen was opened in expectation of finding a perforated peptic ulcer.

Mr. Stephen Power referred to a case in which he had transplanted the ureters, as a preliminary to a cystectomy, for carcinoma of bladder. The patient's condition deteriorated after the operation and she died about a week later without localizing signs. At post-mortem she was found to have peritonitis due to a spontaneous perforation in the fundus of the bladder well away from the site of the carcinoma.

Mr. A. W. Badenoch said that he had seen very few ruptures of the bladder, but he had a patient whose bladder had been ruptured twice. She was a woman aged 27 years who had had multiple papillomata of the bladder for five years. The growths were not very extensive but had given rise to a lot of bleeding and during those five years as well as numerous cysto-diathermies she had had four courses of X-ray therapy. When she first came under his care she was still bleeding, and the

hæmoglobin was 50%. Cystoscopy showed a small area of papillomatosis on the trigone and a larger area on the fundus which was bleeding. The areas were coagulated with a rigid electrode through a pan-endoscope and some clot was washed out of the bladder with a syringe. On re-inspection it was obvious that the bladder had been ruptured as loops of intestine with appendices epiploicæ were seen in Douglas' pouch. An immediate laparotomy was done and an opening in the posterior wall of the bladder was sutured. She made an uninterrupted recovery and left hospital on the fourteenth day. She returned six weeks later, still bleeding with a hæmoglobin now of 30%. He again cystoscoped her and merely coagulated the bleeding point. Next morning she had lower abdominal pain with rigidity and his Registrar diagnosed a further rupture of the bladder. This was confirmed and dealt with at laparotomy. She again made an uninterrupted recovery. In six weeks' time she was readmitted and although there was very much less bleeding, it was still present, so a total cystectomy was performed.

Cytological Diagnosis of the Prostatic Smear [*Abridged*][1]

By J. D. FERGUSSON, M.D., F.R.C.S., and E. C. GIBSON, F.R.C.S. (*London*)

CYTOLOGICAL diagnosis from the examination of secretions requires considerable experience and this applies particularly in the case of the prostatic smear. When ordinary histological examination of prostatic tissue is made the epithelium of the gland can be compared with the stroma and the diagnosis of malignancy rests largely on the presence of invasion of the latter. Cytological diagnosis, on the other hand, has to be made entirely on the appearance of individual cells or groups of cells, and there is no opportunity of ascertaining by this method their disposition in the stroma. However, by the smear technique cell detail is often very much clearer than that obtaining in the ordinary histological section, and this, as will be subsequently seen, provides adequate compensation to the experienced cytologist.

Reliable diagnosis by means of the prostatic smear depends on the following factors:

(1) Anatomical and physiological considerations.

(2) Technique of making the smear.

(3) Cytological examination with reference to whether œstrogens have, or have not, been given.

(4) Interpretation of the results.

(1) *Some anatomical and physiological considerations.*—It is now believed that the so-called lobes of the prostate are merely artefacts in an aging gland. However, it has been shown that in normal prostates there are two well-defined zones, an inner and an outer. Functionally these two zones appear distinct especially in their response to the sex hormones, and it seems that benign hypertrophy arises in the glands forming the inner zone, whereas carcinoma generally arises in the outer. Adenomata arising in the inner zone of glands will, by the pressure of their growth, tend to grow forward and upward in the directions of least resistance and in so doing force the outer zone backwards and downwards so that it assumes a position corresponding to the so-called "posterior lobe". We can thus correlate the clinical and pathological findings, i.e. that carcinoma almost invariably arises in the posterior or outer zone of glands.

With this conception of the prostate in later life, it can be appreciated that the region in which carcinoma is prone to develop will (whatever the size of the gland) generally lie within easy reach of the examining finger and thus be readily accessible both for digital diagnosis and for the purpose of expressing suitable epithelial cells for cytological study. Moreover, the apical region of the gland is of greater importance to the cytologist than the base since massage of the latter will almost invariably lead to contamination of the smear with cells from the seminal vesicles which often leads to confusion in cytological diagnosis.

(2) *Technique of making the smear.*—The cells are obtained by means of prostatic massage and we have found that this is best performed with the patient standing with legs apart and bent forward from the hips, steadying himself on the examination couch (upon which are the clean, numbered slides and the slide container and fixative). The operator can thus perform the massage while watching the external meatus for signs of the prostatic fluid. The massage should not be considered complete until (*a*) sufficient fluid has appeared; (*b*)

[1] The full paper will be published elsewhere.

the patient proves intolerant; or (*c*) five minutes have elapsed. We consider that the method of massage is important and this is based on the fact that secretion from the apex of the gland is important while that from the base is relatively unimportant and misleading because of inevitable seminal contamination. The organ should be thought of as consisting of a series of steps, from the apex to base, and massage commenced first at the apical step, only gradually working upwards towards the base. At the level of the apex, and as far forward as possible, pressure is applied as firmly as the patient will allow, the finger sliding horizontally back to the median groove. This is performed several times and repeated on the other side of the gland at the same level. The next step upwards is dealt with similarly and so on. This should ensure that the first drops of secretion to emerge at the external meatus contains cells from the outer zone which is so important and relatively free from seminal contamination. When the secretion appears a clean slide is taken and a drop is allowed to fall on to it. A clean slide can be placed on the slide prepared as above, the resultant pair being slid apart to ensure a thin preparation. The slides so obtained are gently placed in the fixative (Schaudinn's solution) and staining should be performed within forty-eight hours with hæmatoxylin and eosin. Movement of the container should be kept to the minimum for fear of washing off any of the smear.

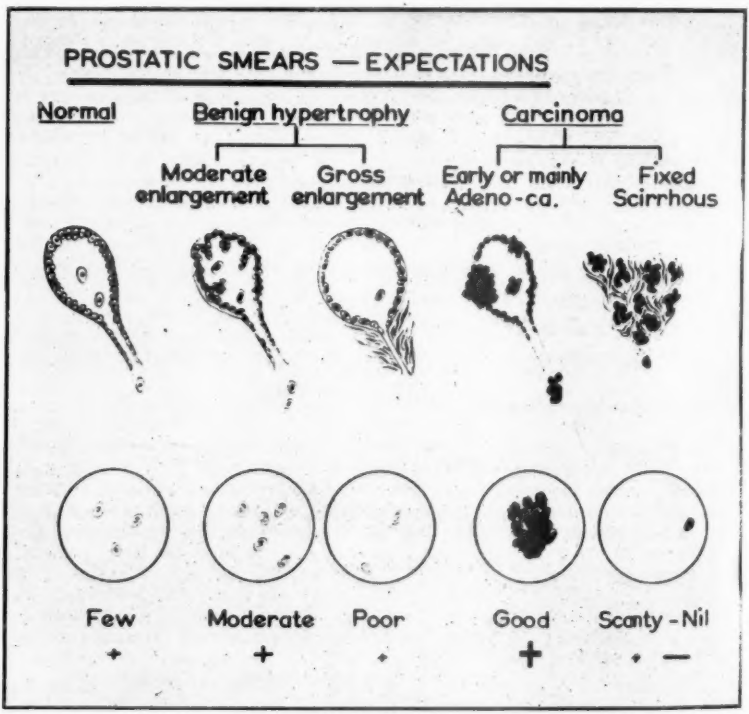

FIG. 1.

(3) *Cytological examination of the smear before and after œstrogens.—Smear expectations*: It is not possible to obtain enough cells from every case to ensure diagnosis but possible failures can usually be foreseen. Fig. 1 shows the main types of prostate encountered and indicates that with very large, adenomatous glands and in the case of obvious large fixed scirrhous growths it is often extremely difficult to get a worth-while smear. The smear, therefore, fortunately assumes its greatest importance in the case of smaller glands, particularly when there is some definite clinical doubt concerning the presence of carcinoma.

The prostatic cells seen in a good smear are mainly derived from the outer zone of glands and if epithelial activity is manifest there are good prospects of obtaining a yield in proportion. If, however, the outer zone of glands is atrophic because of extreme pressure from adenomata

arising in the inner zone, or if the ducts of the former are obstructed by extreme scirrhous reaction, few, if any, cells will be obtained.

Cell types seen: Normal prostatic cells are usually seen singly or occasionally in small groups. They are slightly larger than leucocytes, the nucleus is central and occupies a half to two-thirds of the cell. Nuclear detail is fine and there is little variation in size. Nucleoli are not often seen.

Carcinomatous cells are characteristically seen in groups or clumps. Nuclei tend to be overcrowded and hyperchromatic with marked overlapping. There is great variation in size, the average being greater than in the benign cell. The cytoplasm is often difficult to see and has an irregular and frayed edge.

Transitional cells derived from the bladder and urethra and histiocytes in a variety of sizes and shapes (often crowded with sperms, leucocytes and corpora amylacea) are also seen.

Following œstrogen therapy, two characteristic cells make their appearance, the glycogen cell, which is a round or oval cell with small eccentric nucleus, and squamous cells resembling superficial vaginal cells. The former are modified prostatic epithelial cells while the latter are modified transitional epithelial cells derived from the prostatic ducts and urethra. Malignant cells tend to disappear entirely during successful treatment, any remaining being characterized by the poor staining quality and indistinctness of their nuclei.

(4) *Interpretation of results.*—We are fortunate in having had all our prostatic smears examined and interpreted by either Dr. Gopal Ayengar (late of the Chester Beatty Institute) or Dr. J. Bamforth (in the laboratories of the Imperial Cancer Research Fund). The results shown in Table I represent the first 100 cases which have been examined in which

TABLE I

A Comparison of the Results of Prostatic Smear Diagnosis with those of Subsequent Histological Examination in 100 Cases of Prostatic Disease

Smear diagnosis	Subsequent histology	Final diagnosis	Smear accuracy
38 carcinoma	34 carcinoma 4 benign*	36 carcinoma 2 benign	94·7%
7 ?? carcinoma	2 carcinoma 5 benign†	2 carcinoma 5 benign	
55 benign hypertrophy	2 carcinoma 53 benign	2 carcinoma 53 benign	96·4%
100 cases	100 cases	100 cases	

* 2 cases developed radiological signs of secondary deposits from cancer of the prostate, with raised serum acid phosphatase levels.

† 2 have died—P.M. showed no evidence of carcinoma (but massive sections of capsule were not made). 3 cases are alive and well.

comparison has been possible with standard histological preparations. In 4 other cases diagnosed by the cytologist as having carcinoma and in which histological material could not be obtained, 3 later developed further confirmatory evidence of malignancy in the form of bone secondaries and/or grossly raised serum acid phosphatase levels. Table I further shows that in only 7 cases has there been any doubt by the cytologist as to the correct cytological diagnosis. In the remaining 93 cases a definite diagnosis gave an accuracy of 95·7%. The results compare favourably with those obtained by any standard method of biopsy and the method commends itself as one which can be repeated several times if necessary on the same material. It is, therefore, particularly suitable for diagnosis, for research work and for the follow-up of cases receiving hormonal therapy.

Metaplasia in the Epithelium of the Urinary Tract

By C. K. ANDERSON, M.B. (*Leeds*)

AN understanding of the process of metaplasia in the epithelium of the urinary tract is of considerable importance to pathologist and surgeon alike, for it both helps to clarify the histogenesis of certain tumours and, by indicating potentially neoplastic changes in the surrounding mucosa, greatly aids the logical treatment of bladder tumours.

The renal pelvis, ureter and bladder are lined by a stratified transitional-cell epithelium. The superficial layer is composed of somewhat flattened cells, frequently having two nuclei, and at the surface an ill-defined cuticle is formed. The deeper layers contain more rounded cells which appear able to slide one upon another, and this type of epithelium is well adapted both to resist the macerating action of urine and to allow of rapid changes in volume within the cavities it lines. Transitional epithelium bears certain affinities to squamous epithelium, although it does not normally show any obvious squamous characteristics. It does not, for instance, show well-marked prickle cells, as does the squamous epithelium of the upper alimentary tract, nor does it elaborate keratohyalin or give rise to appendages such as sweat glands and hair follicles, as does the skin. We may, therefore, consider it a type of squamous epithelium in a lowly degree of differentiation.

During the course of development and specialization epithelial cells become fixed within fairly narrow limits as to their morphological characteristics. The fertilized ovum is totipotential and will differentiate into cells of all types, and the cells of the embryonal layers are multipotential and will form cells of several types, but adult epithelial cells, whatever their normal degree of differentiation, will be replaced under normal conditions of wear and tear by cells of identical type. This process is referred to as normoplasia and represents the body's normal response to a normal environment. But if the environment becomes abnormal then an abnormal response may follow and this is particularly liable to happen within the epithelium of the urinary tract. The changes produced may manifest themselves in two ways. First, cells may differentiate to a degree beyond normal, a process referred to as prosoplasia (Fig. 1). This is demonstrated in transitional epithelium by the

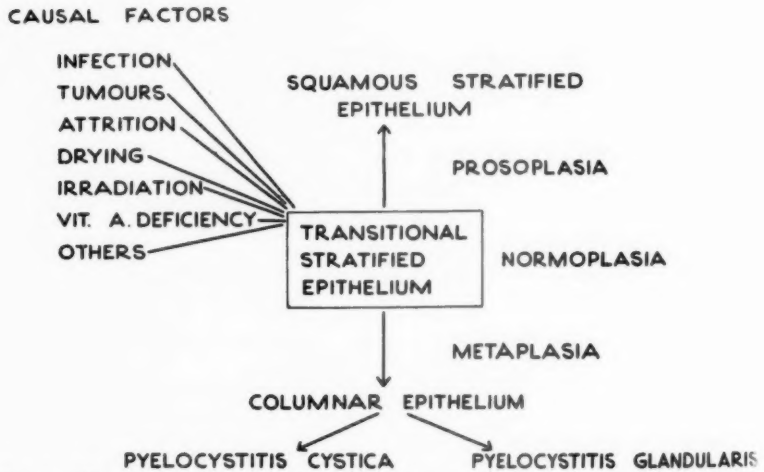

FIG. 1.—Diagrammatic representation of the processes of prosoplasia and metaplasia in the epithelium of the urinary tract.

cells becoming increasingly squamous in character; basal papillæ are formed, prickle cells become prominent and keratin may often be produced, until the epithelium may resemble skin without the presence of dermal appendages. Secondly, cells of a given part when undergoing rapid multiplication may appear to acquire a degree of fœtal plasticity and will then mature to form a type of cell not met with in that situation under normal conditions. This process is known as metaplasia and is shown in transitional epithelium by the appearance of columnar and mucus-secreting goblet cells frequently arranged to form tubular glands. It is to be noted that pathologists usually use the term "metaplasia" to cover both the process of prosoplasia and true metaplasia.

Squamous prosoplasia is well seen in areas of leukoplakia such as occur in the renal pelvis and bladder in association with calculus disease, particularly with urinary infection, tuberculosis and ectopia vesicæ. Epidermoid carcinoma is rare both in the renal pelvis (Gahagan and Reed, 1949) and in the bladder (Royce and Ackerman, 1951). It is usually associated with areas of leukoplakia and represents a tumour arising from prosoplastic epithelium. Case I is an example of this.

Case I.—K. T., female, aged 70. This patient was seen by the physicians complaining of backache of many years' duration. She was found to have a non-functioning left kidney which contained a large calculus and was advised to have the kidney removed. When the nephrectomy specimen was examined it was found that the kidney was drained by two pelves and two ureters. The lower pole and pelvis were normal, but the upper pelvis was dilated and showed leukoplakia throughout its entire extent. It contained both an oxalate stone 3·5 cm. in diameter, and an unsuspected papillary tumour, 3 cm. in diameter. The tumour was an epidermoid carcinoma showing the most extensive keratinization (Fig. 2). Mitotic figures were numerous and there was deep invasion of the renal

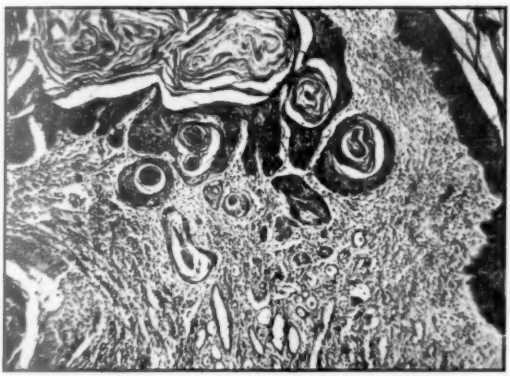

FIG. 2.—Epidermoid carcinoma of the renal pelvis invading the parenchyma which shows chronic inflammatory changes. The remainder of the epithelium of the pelvis shows squamous prosoplasia. (H. and E. ×40.)

parenchyma, which showed advanced pyelonephritis. This case is quite typical, most of these tumours are associated with long-standing infection and calculus disease and in nearly all instances the presence of the tumour is unsuspected at the time of operation; they appear to carry a very poor prognosis. The patient is alive and well eight months after operation.

Areas of squamous prosoplasia, often showing a total absence of keratinization, are seen in transitional cell tumours of the renal pelvis and bladder. They are often prominent in the deeper portions of the tumour, particularly where invasion occurs, and are examples of prosoplasia taking place within tumours. They are a very good indication of at least some degree of malignancy in the growth.

I now turn to a consideration of the process of true metaplasia, the commonest example of which is to be found in the condition of pyelocystitis cystica. This is quite frequently observed by the pathologist both in surgical specimens and at autopsy, particularly when the urine is infected, but is also noted in cases of tumour formation, calculus disease and urinary obstruction with sterile urine.

The histological appearances of the condition are characterized by the finding of islets of epithelium extending below the surface layer, the Limbeck-Brunn epithelial cell nests. These nests may consist of solid strands of cells or, more commonly, of short tubules, which may branch in simple fashion. These are lined by transitional and columnar epithelial cells and contain inflammatory cells and debris which stains with mucicarmine. They usually communicate with the surface, but blockage by cellular proliferation or inflammatory swelling may convert them into retention cysts, which give the condition its characteristic appearance, and these are frequently lined, at least in part, by low cuboidal epithelium. In the genesis of pyelocystitis cystica it is the transformation of transitional to columnar cells with basal nuclei which produces the lumen within the epithelial nests and hence the tubular structure which they ultimately come to possess. The further elaboration of columnar cells to mucus-secreting goblet cells gives rise to a glandular type of epithelium which, in advanced cases, may mimic that of the large intestine.

Cystitis glandularis is certainly a rare condition but one does see areas of glandular metaplasia in long-standing bladder infections and a few cases of bladder tumours, and I think it is certainly more common than one might suppose from the scanty literature. Adenocarcinoma of the bladder accounts for about 2% of all bladder tumours (Abeshouse, 1943) and is more common in extrophy of the bladder than in the normally situated organ.

Adenocarcinoma may also arise from the urachus and in this situation is continuous with the cavity of the bladder in about 33% of cases (Rappoport and Nixon, 1946).

Pyelitis glandularis is an extremely rare condition (Aiken, 1955), and only three cases of adenocarcinoma of the renal pelvis have been recorded (Ragins and Rolnick, 1950), all the cases showing evidence of long-standing infection and calculus formation. This is the very brief report of a fourth case.

Case II.—B. W., female, aged 63. This patient, who would admit to no previous urinary symptoms, suddenly noted the presence of a swelling in her right loin. After investigation this was thought to be a calculus pyonephrosis and a nephrectomy was performed. On examining the specimen it was found that the dilated pelvis and calcyces were filled with gelatinous mucin. Numerous small stones were present and there was an irregular papillary tumour in the lower pole arising from the pelvic epithelium. The renal parenchyma was completely destroyed by the combination of back pressure and infection. Histological examination showed the tumour to be a papillary adenocarcinoma, while further sections showed that the epithelium covering the pelvis, calyces and ureter had undergone metaplasia to a glandular pattern virtually identical with that of the large bowel (Fig. 3). The patient is alive and well fourteen months after operation.

FIG. 3.—Glandular metaplasia of the epithelium of the renal pelvis. The parenchyma is completely destroyed but the remnants of two dilated tubules are seen filled with calcified debris. (H. and E. ×33.)

I wish to thank Mr. J. Hainsworth, A.I.B.P., and Miss Campbell of the Department of Medical Photography, St. James' Hospital, Leeds, who have provided the diagram and photomicrographs.

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Section of Surgery

President—HAROLD C. EDWARDS, C.B.E., M.S., F.R.C.S.

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DISCUSSION ON PALLIATION IN CANCER

Dr. C. J. Gavey:

In patients with inoperable cancer we are not necessarily dealing with hopeless cases, for hope must remain, but nevertheless the problem is usually that of the management of the individual who is nearing, or who has actually reached, the terminal stage of life.

Pain.—The first great principle concerns the relief of pain when it is present. Patients have a right to know that we really can relieve pain. Once assured of this, they can take a more philosophical view of their disease for it is difficult to be philosophical when in pain. A recent survey of public opinion on cancer by Paterson and Aitken-Swan (1954) shows quite clearly how alarming the thought of cancer usually is. The women interviewed rated cancer as the most alarming of the serious diseases and gave the reason why in terms relating chiefly to pain. A victim of cancer may say "I am not afraid of death but I am afraid of pain and I suppose I am bound to get worse" (Clark-Kennedy, 1954). Patients who have recovered from cancer describe their emotions in an almost uniform manner. They have dreaded pain and found it to be far less than they had anticipated. Indeed some have expressed the idea that the medical profession should make a special point of dispelling the prevalent impression that cancer is necessarily very painful.

Assessment of the degree of pain comes fairly readily to those with experience but newly qualified doctors and inexperienced nurses often go wrong on this point. The bias is not enough in favour of the patient. Indeed, how can we judge the intensity of pain? In the one patient a given lesion may cause exquisite pain, in the other the same lesion is better tolerated. Thought given to this simple problem leads me to recommend that if there is substantial pain it is wise to give an analgesic continuously and to add whatever else is necessary from time to time. Too often one finds a patient who has gone without an analgesic because he has not complained of pain at the opportune moment. I know of nothing better for continuous analgesia than Mist. Acidi Acetylsalicylici Opiata, four-hourly [Tinct. of opium 8 minims, Aspirin mixture (B.P.C.) to ½ fl. oz.]. A few cannot tolerate aspirin in which case codeine can be given instead.

Another point of importance is the too rigid avoidance of drugs of addiction. I refer particularly to pethidine (100 mg. = 16 mg. of morphine). Addiction is, in fact, uncommon, too uncommon to weigh at all in the decision whether or not it should be used. Pethidine has advantages over morphine in that it does not cause mental lethargy in those who do not wish to be "doped" in the mental sense, and there are not a few of such patients. Pethidine unfortunately has only a brief action, lasting two to four hours. Methadone (10 mg. = 10 mg. of morphine) is also valuable but its depression of cough may lead to trouble in emphysematous or old patients and bad dreams are sometimes a nuisance. Phenadoxone (10–30 mg.) has an analgesic effect for three to four hours when given by mouth and it also possesses a mild sedative action. Hypnotics such as sodium amytal and hexobarbitone are effective provided they are repeated without hesitation, and are used with analgesics. Chlorpromazine has proved its worth in patients with intractable vomiting. Given by

mouth the drug may be retained long enough to be absorbed, but if it is rejected, parenteral administration is available. The dose is 25–50 mg. t.d.s. If we do not want mental sedation it should be stopped when vomiting ceases but we need not fear the more serious side effects such as liver damage in these patients. R 48 is in my experience really useful in reducing pain from hepatic secondaries.

In the terminal stages, morphine is, of course, still the most valuable drug and it should not be spared when the time has come to use it; but when that time shall have come is often hard to decide. When observing patients with inoperable cancer, we can detect perhaps more clearly than in any other fatal disease, a fairly sudden change, from one day to the other; a change in both physical state and outlook arising from overwhelming weakness; a sign that the body has given up the struggle. From this point morphine should seldom be withheld and considerable pain will determine its earlier use. It is wise not to exceed single doses of 20 mg. of morphine; repeat it if necessary after a suitable interval. Hyperduric morphine mucate, 16 mg., lasts longer and when combined with hyoscine mucate it is especially helpful in relieving tracheal rattle.

When there is no pain in terminal illness, morphine should not be used automatically but it has a limited place. I have not used cocaine but some physicians think highly of it in these circumstances. The decision as to when, if ever, the patient should be helped over the border, rests on a higher plane of judgment than can be laid down in rules or laws and it is for each practitioner to decide for himself carefully how far he can assist his desperate patient without transgressing the law (Gavey, 1952).

Telling the patient.—We have gone a long way since the days of Paget (1814–1899) who accepted a contest in brevity with a patient who came into his consulting room and merely thrust out his lip saying "What's that?" "That's cancer," he answered. "And what's to be done with it?" "Cut it out!" said Sir James. I do not suggest that there is often difficulty in telling patients what is necessary but a minority in whom it is difficult may be reduced if we bear in mind that patients do not share our knowledge of the terminal stage of disease. Occasionally the patient seeks such information. "What will be the manner of my going?" he asks. Few realize "how easy it is to die" (William Hunter). Few realize the clouding effect of the "toxæmia" that ends in death.

When patients persistently seek information we must be ready to enlighten them. To refuse to do so may be expeditious but morally wrong unless we are dealing with patients from areas, still to be found here and there in the British Isles, where the mere mention of cancer, in whatever form, engenders a dread which deters them even from investigation in hospital. The capacity to receive bad news is variable indeed but a nervous disposition alone does not preclude remarkable courage in the face of a grave diagnosis. Sir Frederick Treves (1923) who wrote much on these matters said: "Very often the message can be worded in so illusive a manner as to plant merely a germ of doubt in the mind, which germ may slowly and almost painlessly grow into realization of the truth." Frequent visiting does give an opportunity for that germ to grow and often doctor and patient realize at the same moment that the time has come for doubts to be resolved and a calm ensues which leads to mutual consolation. I think myself that it is best for both husband and wife to know the situation but one's prime obligation is to the patient's wishes in the matter. Dean Inge's (1939) view was: "On the whole I think the patient has a right to know the truth."

The power of self-deception may be very great and it behoves us to promote this at times otherwise the patient may become intolerable to himself and to his family. Self-deception may arise from the patient's realization of his incapacity to receive decisive information. However, most patients can accept the truth slowly if we attend to proper preparation for it, and when imparting the truth we can still stress favourable features which are usually not hard to find, at least in regard to the immediate prognosis. It has been said of a certain surgeon that when he told a patient of cancer in his own inimitable way the patient found it an acceptable illness.

I feel that there is no place for a deliberate lie, or for silence. A priest once told me that "a considerable number of patients say that doctors tell them nothing, or practically nothing, about their complaints. Not a word of explanation or sympathy or hope and the poor sufferers are left with their guesses wondering what is going to happen next". The priest was fully aware of the reasons for reticence but had no doubt that it was often too severe.

Intelligent patients, now better informed in matters medical, present us with ethical problems increasingly similar to those arising in medical men or nurses who fall victim to cancer. In these circumstances there is more room for frankness, if it is sought. That is the determining factor though we must allow the patient opportunities and be ready with

suitable answers. It is difficult, well-nigh impossible, to continue visiting such patients if they do not have a reasonable idea of the truth. Some of the finest examples of resignation and serenity have occurred in medical men.

For completeness I mention the patient who never suspects that the end is near even though one has acted on the supposition that he did know, and who speaks of recovery and of holidays during the next year. Near relatives have assured me that such a patient, intelligent enough, had no suspicion whatsoever of death even on the last day. I should say that when I have allowed this to happen the near relative's desire that the patient should not be told (because of incapacity, real or otherwise, to receive the truth), has influenced me in not volunteering the information. I realize that Roman Catholics would condemn this attitude, and it would not arise concerning a patient of that faith.

Visiting.—I do not profess to have complete insight into what the patient feels when he knows he has an inoperable cancer. The more one studies the question the more baffling it is. We partly overcome the difficulty by using a kindly attitude but it is hard to determine how supportive it really is. It is here that the personality of doctors and nurses comes in. *Frequent visits* are fundamental even if we do nothing overtly and it is for us to take or to seek opportunities of helping in this way. I stress this because modern medicine and surgery enable us so often to spend our time helping in a very concrete and substantial way that we have little time left, it seems, for simple visiting. While recognizing the impossibility of reaching the ideal amount of visiting I do think we should from time to time ask ourselves whether we are paying enough attention to this important aspect of our work. It would be a pity if we should ever deserve the reproof: "the doctor has lost interest in my case." The senior nursing staff feel their task to be infinitely easier if the chief takes adequate time at the bedside of the patient who has almost run his course. In hospital it is very necessary that the patient should know conclusively who is actually in charge of his case. There must never be any room for doubt about this. The risk of such doubt is small in this country compared with some others.

At home a visit may enable a trifling but trying symptom to be quickly removed. The task of relatives is also made easier if the doctor visits regularly and often and he may note in a relative the need for an intermission in nursing before a breakdown occurs. I think there is a good deal to be said for advising relatives to show their sympathy by being practical and by avoiding a hush-hush attitude when the truth is known. We do not want "sympathy" to be the hardest thing the patient has to bear, though I am not suggesting that this is common.

We must not detract from the value of faith which is one of the positive virtues. As Paul White (1951) said: "We need to analyse more than we have yet done the physical effect of the influence of courage, optimism and patience. We have paid perhaps undue attention to the reverse, that is, the harmful effects of fear, sorrow or anger."

Surgery and radiotherapy.—The proper employment of radical surgical measures and radiotherapy calls for the finest judgment. Thus in the relief of pain from bony metastases from carcinoma of the breast, bilateral adrenalectomy is most successful, though its limitations are obvious. When in doubt I am biased in favour of surgical measures which offer some prospect of relief, or laparotomy in appropriate cases to achieve certain knowledge that a growth is, in fact, not operable. But the situation may have to rest as Sainsbury (1906) put it: "Finally should the decision be left to us, as in many, perhaps in most, cases it will be, and we conclude that all things considered, it is wiser to stay the hand than to be active with it then we must have the courage to let it be idle and abide the issue." Radiotherapy in its several forms has a big place in the treatment of inoperable cancer and the work should attract some of our best young men.

Of human understanding.—There is need for a "generality of understanding" (Walshe, 1948) in regard to our patients. There is a growing feeling among them that we never should give up hope; that something can yet be done. This accounts for unexpected requests for further opinions and though this may hurt one at times, it is a trait in human nature which bears understanding and sympathy even when the patient seeks fields of unorthodox treatment. Unreasonable demands should not surprise us when we consider that red and white roses together are still usually resented in the sick-room and number 13 is still held by many to be unlucky.

I pass for a moment to the understanding of the terminal phase. At this time let us remember that the belief in life after death is almost universal, so it is wise to assure that spiritual help is available. But I agree with Osler and others that it is not incumbent upon us, as medical men, to give it—simply to see that it is available. It is a fact I think that

most patients are not afraid of death but they are reluctant to die. In his address on one of my patients who died of carcinoma, the Dean of Westminster said: "The courage and serenity with which she faced the prospect of death was an example to us all. It was a form of courage and serenity which sprang directly from her Christian faith and from her belief in the reality of life to come. Thus she died at peace with God and in sure and certain hope of eternal life."

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Professor Norman M. Dott:

I speak on this subject as a neurological surgeon. Cancer is foreign to neural tissues and is encountered by the neurological surgeon as an invader from other corporeal domains.

The neurological surgeon may be required to deal with cancer in four different ways: (1) he may encounter and deal with metastatic cancer of the brain or spine while the nature of the disease is still in doubt—he then makes the diagnosis and treats the local brain or spinal lesion; (2) when called upon to assist in ameliorating the course of cancer by means of hypophysectomy; (3) when requested to mitigate pain caused by cancer; (4) when required to preserve important neural functions threatened by cancer.

Metastatic cancer of the brain has notably increased in frequency in recent years in proportion to the increase in bronchial carcinoma. In patients over 30 years of age, with rapidly progressive cerebral tumours, radiographic examination of the chest and other appropriate means of search for a possible pulmonary primary neoplasm are routine procedures. Not infrequently, however, the cerebral metastatic lesion is the first recognizable focus in this disease, and the diagnosis of cancer is first established by exploration of the cerebral metastasis. In these circumstances the neurological surgeon treats the local cerebral lesion with the object of preventing or delaying further cerebral damage. He may proceed to excision of a favourably placed metastasis or to decompression of the less favourably sited or multiple cerebral lesions. Having done so he seeks the help of the oncologist in the management of the neoplasia as a disease entity.

The oncologist is commonly the radiotherapeutic specialist who has the largest experience of neoplasia in its many sites of origin and metastasis and in its various stages of evolution. Not infrequently the oncologist may be represented by a team, with the radiotherapist as leader, supported by a pathologist and an endocrinologist with special interest in the neoplastic. It has become essential for the "system specialist" such as the neurological surgeon, especially when dealing with cancer—a neoplastic disease essentially foreign to his territory—to rely on the oncologist or his team for the management of the disease as a neoplasia.

In the management of cancerous neoplasia it has been found that in the tumours of parasexual origin, especially those of the breast and the prostate, modification of the sex hormone state may profoundly affect the progress of the disease. In the younger age-groups diminution of œstrogens or of androgens by castration, by adrenalectomy or by hypophysectomy has procured striking amelioration of the advancing neoplasia, even in the most advanced cases. In the older age groups the administration of these sex hormones has proved notably beneficial. Whether hypophysectomy has special indications or advantages as contrasted with adrenalectomy or with castration is not yet known. So far as hypophysectomy may be required in the management of neoplasia, the neurological surgeon will join the oncological team to make that contribution.

I think that pain due to cancer could and should be abolished in those cases in which pain constitutes an important factor in the patient's total distress. It is important to

recognize that pain has two main aspects—on the sensory level a perception; and on the emotional level a distressful experience. Pain appreciation is a function of consciousness. Modern psycho-physiology, continuing the ancient search for the seat of the soul, visualizes a temple of consciousness with its foundations in the reticular formation of the upper brainstem and in the nuclear masses of the diencephalon and with its upper storeys in the cerebral cortex. In the foundations dwell those shadowy and gigantic forces—the affective functions. In the upper storeys are the more discriminatory or intellectual, but less fundamental functions. The two, working together, constitute the physical mechanism of consciousness. It is believed that the sensory perceptive aspect of pain and its discriminatory sensory accompaniments are functions of the cerebral cortex; while its affective or distressful aspect attains consciousness in the diencephalon.

Pain can be facilitated or augmented by the affective state or tone of the individual—for example when associated with the apprehension occasioned by severe dyspnœa; or with the anxiety occasioned by the increasing enfeeblement from advancing cancer; or again by the anxieties of an endogenous depressive state. Pain can equally be inhibited by sufficiently potent preoccupation with other matters—for example on the field of battle, at the martyr's stake, and to a lesser extent by religious belief and by philosophical reasoning.

Pain tolerance is also considerably dependent on the time factor. A degree of pain easily borne for seconds or minutes becomes intolerable over periods of days, months or years. Many neural mechanisms are susceptible of fatigue; and the mechanisms of inhibition of pain in cancer are so susceptible. The pain-appreciating mechanisms on the other hand, are peculiarly resistant to fatigue and remain outstandingly acute and unimpaired over long periods. Thus the chronic sufferer—the cancer victim—becomes increasingly vulnerable to pain; his resistance weaker and his appreciation of pain unimpaired and therefore more insistent.

When we survey the chronic cancer victim we see his total distress; and some analysis of it is essential to its proper management. How much is actual pain a factor in his total distress? How much do incidental or endogenous anxieties or revulsions play a part in augmenting such pain as he has or in adding to the sum of his distress independently of pain?

The answers to these questions provide the keys to management. It may be that the methods of psychological medicine, ranging from philosophical discussion and suggestion to electro-convulsive therapy, provide the most effective and sufficient treatment. It may be that analgesic drugs—the simple, acting mainly in diminishing pain perception, the more potent, including the recently introduced chlorpromazine, so modifying consciousness as to blunt distress and suppress anxiety—can provide what is necessary.

Where pain is an outstandingly severe and prominent factor in the patient's total distress, and when the life expectancy is three months or more, surgery for pain may be indicated. Surgery for the mitigation of pain takes two principal forms: (1) interruption of the local pain-conducting pathways, so that the pain stimuli do not reach consciousness; (2) modification of consciousness or personality in its affective state by leucotomy, so that the distressful element of the pain experience is mitigated or abolished.

The indications for pain-pathway interruption are a life expectancy of three months or more and that local physical pain is the major factor in the patient's total distress. One should note that the pain of infected cancerous growths, especially those of the mouth and pelvis, can often be sufficiently controlled by the use of appropriate antibiotics. Local osseous pain of cancerous deposits can often be relieved by appropriate hormonal modification or by local palliative X-radiation. These measures will be tried in suitable circumstances before resorting to surgery for pain. Examples of pain-pathway interruption are: trigeminal nerve interruption by alcohol injection of its sensory root, followed by cervical sympathectomy to prevent neurotrophic keratitis, for cancer of the face or mouth or jaws. When the disease extends to the throat or neck, surgical division of the glossopharyngeal nerve and upper rootlets of the vagus and posterior roots of upper cervical spinal nerves by a sub-occipital operation can be added. For pain due to cancer of the pelvis, and from the lower half of the body, section of the spinothalamic tract about the second thoracic segment of the spinal cord on one or both sides is the most effective and also the least damaging procedure. It is selective for pain and temperature and does not interfere with other important sensory functions for the limbs; nor does it cause the unpleasant paræsthesiæ associated with more peripheral sensory nerve interruptions. For local pain due to cancer about the thoracic inlet, one can combine spinothalamic tract section at the second cervical level of the cord with division of the upper cervical posterior roots.

These operations of interruption of the local pain-pathway are brilliantly effective and

reliable for pain alone, and are ideal in carefully selected cases. They are limited in their sphere of usefulness by their very specificity. They do nothing for other causes of distress of the victim of cancer.

It is in these cases of more multiple causes of distress that leucotomy by modifying the affective receptivity and reactivity removes not only the distressful quality of pain itself but those of the other adverse factors in the cancer case. Patients so treated, when specifically questioned on the subject, will state casually that they can still feel the pain; but they will not complain of it spontaneously and they will not demand or require analgesics. In fact they cease to be distressed by pain and by other adverse developments in the course of cancer. There are, however, limitations upon this treatment also. The patients so treated not only cease to be distressed by pain, but also by moral wrongs, by shameful situations, by the misfortunes of their friends. Nor can they experience with their former depth of feeling the satisfactions and pleasures of life. The alleviation of distress from pain and other troubles is bought at the expense of a flattening or shallowing of the whole affective personality. Such patients will not react with full responsibility or keen judgment to the various problems and situations of life. Our use of this merciful procedure for the cancer victim is limited to the management of cases in which such an irrevocable alteration of personality can be justifiably accepted. I believe that such cases are numerous.

Lastly neurological surgery may be required in cancer to preserve important neurological functions, whose loss would add seriously to the patient's troubles.

Examples are cranial decompression, with or without removal of a local metastatic tumour, to relieve headache and vomiting, to preserve vision, or to preserve other cerebral functions. Similarly it may be necessary to carry out spinal decompression with or without local tumour removal when a cancerous metastasis compresses the spinal cord or nerve roots. This is simply the surgery of brain and spinal cord tumours applied to the cancer patient—with the life expectancy and the specific management of the cancerous neoplasia as the dominant determining factors.

In cancerous compression of the spinal cord, surgical decompression is a procedure of urgency—to be computed in hours, not in days—if the miseries of paraplegia are to be averted. In a majority of these cases the vertebral column is eroded and unstable. Here, rustless steel internal splints, applied to the spinous processes, may enable the patient to become ambulant for his remaining life. In a minority the bones are not involved and such splintage is not required.

Thus, the sufferers from presently incurable cancer, may, in properly selected cases, gain much from neurological surgery—perhaps in securing remission of the disease itself, and certainly in the relief or avoidance of many of its distressing features.

Dr. G. F. Abercrombie:

Most patients do not mind dying, but they do not wish it to be painful. "It must always be remembered that there is in every mortal illness a point beyond which any further attempt at *curative* treatment is not only useless but cruel" (Hutchison, 1926). What is sometimes attempted to-day in the name of palliative treatment ought to be denounced in equally vigorous terms. One of the inescapable duties of the general practitioner, who [illegible] regularly and frequently upon such patients, is to say "Hold! Enough". Let [illegible] forget that excellent aphorism "Morphia exists to be given, and not merely to be [illegible]".

I think the great majority of these patients would prefer to end their lives i[illegible]own homes if it could be done without placing an intolerable burden on their attendants; but unceasing supervision is impossible in these days, and hospitals should make it a point of honour never to refuse to readmit their former cancer patients *in extremis*.

Many surgeons cannot bring themselves, and will not be persuaded, to tell a patient the truth about his malady, and thus they place the general practitioner at a great and [illegible] disadvantage. That would not matter if the patient were at ease in mind, but all too often he is not. "They tell you nothing in hospital, sir. What is it? What *is* the matter with me?" It is perfectly true that some remain in absolute ignorance, apparently, of the fact that they have an incurable cancer right up to the very end, and they are accounted fortunate; but it really does not follow that they would have fared worse if they had been told the truth. How many practitioners would wish their medical attendants to attempt to deceive them? Do we not all say "If this happens to me, I want to be told. I want to know"?

We ought to give our patients credit for that common sense and courage which we know they possess. Instead, we are afraid to tell them, possibly because we fear they may commit suicide—an extremely unlikely event—or because, mistakenly, we judge them unable [illegible]

face the suffering, assumed to be inevitable and supposed to be intractable. Cancer has a dreaded reputation, which now needs urgently to be reconsidered. Very many patients' lives end peacefully, and I doubt whether their distress is any greater than that experienced in other terminal conditions.

What happens when patients *are* told that they have cancer and that it cannot be cured? Usually, nothing very noticeable—the information is digested, a mental adjustment is made, and in all probability the subject is never brought up for discussion again. Their kith and kin are spared attempts at dissimulation, the desperate search for remedies ceases, and treatment by analgesics and narcotics is accepted as a matter of course. Certainly, very great care is needed, but I cannot recall that I have ever had good cause to regret telling the truth. The bond of sympathy and confidence between doctor and patient is thereby drawn closer and holds firmly to the end.

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Professor C. A. Wells: Some of the most difficult problems of palliation may best be considered not by one specialist individual, "the cancerologist", nor by any one general surgeon acting alone, but by a group of individuals, each able to make his own peculiar contribution to the discussion. With the increasing complexity of all therapeutic measures in surgery the time is approaching when many difficult problems such, for example, as that of hypertension must be tackled, not by the general or the specialized physician or surgeon acting alone, but by a group of people associating themselves for the purpose of the study and treatment of particular types of diseases. Only by some such arrangement or by some other method of full and free consultation between different interests will it be possible to offer the best combination of treatment in complicated clinical problems.

Dr. P. W. Nathan: One of our main difficulties in looking after these patients with severe pain is the nursing staff. In this country we are brought up in a puritan culture; and in this culture, it is implied that suffering is a good thing, and that a certain amount of pain is desirable. This view of life seems to afflict nurses with particular severity. It seems to be impossible to persuade them to give enough analgesics.

The question of addiction in these patients with incurable cancer has been raised. What if these patients do die addicts? They are going to die anyway; why should they not die addicted to an analgesic? In any case we find that most of them do not become addicts. All the patients on whom we have done successful pain-relieving operations have not asked for the drugs which they were accustomed to have before the operation.

Dr. Gavey brought up the point about not telling the patient a deliberate lie. I think that this is *the* place for a deliberate lie. For some years we have been doing research on pain-relieving operations on patients with cancer. When I began this work, I imagined that there would be only a few patients to whom one could tell the truth—that they had incurable cancer. Now I believe that there are as good as none. It seems that people cannot stand it. It may be possible sometimes to tell people over 70 or 80; but younger than this, people are not ready to die. This is no problem peculiar to cancer. In neurology we meet many young people who have a fatal illness; it would be cruelty to tell any of them that they are going to die.

Dr. L. Dulake: In view of many comments on the question "should the patient be told of the incurable nature of his disease", I do not feel that any rigid rules can be applied, certainly not that all should be told or that none should be told. In my experience many patients become aware of their condition. A day comes when something in the handclasp, in the expression of the patient, implies acceptance of a hopeless situation. From then on, doctor, patient, and close relations often find it easier to play a gentle game of "make-believe". Human understanding bridges many gaps.

Mr. Eric L. Farquharson: There is a very good working rule to guide us as to how much a patient should be told, when he is suffering from irremovable cancer. The patient should be told the truth only when it appears certain that he *really* wants to know, or that the information would be of definite benefit to himself or to his family. Even after the most unsuccessful operation, many patients are buoyed up with the hope that a cure has been

achieved; such hope may remain with them even when it is obvious that they are sinking fast, and it is often their only source of comfort as the darkness closes in. The hospital ward or the specialist's consulting room is seldom the best place to impart such news, and, perhaps more important, the specialist himself is seldom able to judge how much a patient should be told. It seems so much better that, in the exceptional cases where truth must prevail, it should be told by the family doctor, so often an old and trusted friend, in the quietness and privacy of the patient's own home.

Mr. Murray Falconer: Hypophysectomy for parasexual tumours, principally carcinoma of the breast with widespread metastases, is in its infancy, having been introduced by Luft and Olivecrona only two years ago. It is, however, an operation with a low mortality and little morbidity, and regression of the metastases appears to occur in more than half the patients, even after widespread dissemination. The follow-up periods, however, are still short, and so it is not yet possible to compare its merits with those of adrenalectomy. The encouraging results to date, however, indicate that the procedure warrants further trial, and make it difficult to say that there is ever a stage in carcinoma of the breast where treatment should be withheld, because the disease has become advanced and widespread.

Mr. Robert Cox: Many of the previous speakers have spoken about cancer exclusively, but the problems are those of malignant diseases in general, particularly with the wider age distribution of other forms of malignant disease.

The problem as to whether the patient should be told, is clearly different in the aged patient who has already run the full course of his life, as compared with one in middle life. The problem is even more difficult in the young adult, perhaps married and with the responsibility of young children dependent on him, and most of all it seems wrong to inform the patients when they are of tender years.

On the use of morphia those who work in hospital centres which deal with large numbers of late cases of malignant diseases are aware that often the miseries of morphia poisoning are worse than those of the disease for which the drug has been given. Frequently these patients are made much more comfortable by simple nursing care, regularization of their bowels, proper feeding and the withdrawal of morphia either to a reasonable level or its substitution by a simple mixture containing aspirin and opium which, in many cases, is quite adequate to control the pain even of the terminal phases.

Mr. Maurice Ewing: No one in the Discussion has spoken of the experience of the radiotherapist in the palliation of malignant disease. I am sure that a great many of us must often turn to him for help in the control of recurrent cancer in our surgical failures and I often question whether the irradiation that is given in such cases has, in fact, any real value as a palliative.

Miss G. M. Barry: The question of whether to tell a patient that she is dying of cancer must be settled individually. I have personally been reproached by patients at the eleventh hour for not having told them sooner, as there were various things that they would have wished to do had they had time.

I also think that there are cases in which a large palliative operation carrying a definite mortality rate should not be suggested to a patient who urgently desires to live for a few more months in order to finish a particular piece of work.

Section of Pædiatrics

President—G. H. MACNAB, M.B., F.R.C.S.

[*January* 28, 1955]

DISCUSSION: EOSINOPHILIC GRANULOMA. LETTERER-SIWE DISEASE. HAND-SCHÜLLER-CHRISTIAN DISEASE

Dr. Reginald Lightwood:

Histiocytic Type of Reticulo-endotheliosis

According to present teaching the syndromes of eosinophilic granuloma, Letterer-Siwe disease and Hand-Schüller-Christian disease are considered to be clinical varieties of a common pathological process. There has been much confusion in terminology as it is usually taught that the disorder consists of granulomatous lesions of the reticulo-endothelial system (Gellis, 1954), but the term reticulo-endotheliosis, without qualification, is not sufficiently definitive because it does not indicate which of the three main cell-types of the reticulo-endothelial system is at fault, although the histiocyte is now regarded as the characteristic cell of the process and, indeed, the common denominator in the pathology. Again the different guises in which the disease shows itself have, in the past, been regarded as separate conditions but this conception is probably false and their eponymous names only have the advantage of descriptive convenience. Another way in which terminology is unsatisfactory comes from the fact that the ætiology of the condition is not known and an appropriate general designation is required for the histiocytic response of undetermined cause. Louis Lichtenstein (1953) has, like certain other workers, assumed the nature of the disorder to be inflammatory (a view which I think is still open to question), and he has proposed that *histiocytosis X* can be used as a convenient generic term to imply the continuity of the syndromes and the uncertain ætiology. I would prefer, however, to speak of histiocytic reticulo-endotheliosis in this sense.

Table I gives the principal clinical features found in 15 cases of histiocytic reticulo-

TABLE I.—SUMMARY OF THE CLINICAL FEATURES OF 15 CASES OF HISTIOCYTIC RETICULO-ENDOTHELIOSIS

Clinical type	Sex	Age at onset	Bones	Skull	Skin	Liver	Spleen	Glands	Treatment	Duration Yr.	Duration Mth.	Outcome
Letterer-Siwe	M	5/12	+	+	+	+	+	+	0	1	2	Well
	F	2/12	0	0	+	+	+	+	0		5	Died
	F	2/12	0	0	+	+	+	0	Cortisone	2	1	Well
	F	9/12	0	0	+	+	0	0	0		1	Died
Eosinophilic granuloma of bone	F	9	+	0	0	+	+	0	0		10	Well
	F	2	+	+	+	0	0	0	0	1	8	Well
	F	1	+	+	0	0	0	0	0		7	Well
	F	1	+	+	0	0	0	0	Cortisone	2	5+	Ill
	M	2	+	0	0	0	0	0	X-ray		10	Well
	M	3	+	0	0	0	0	0	0		6	Well
	F	3	+	0	0	0	0	0	0		1	Well
	F	1	+	0	0	0	0	0	0		10	Well
Hand-Schüller-Christian	M	2	+	+	+	+	0	0	Cortisone and X-ray	2	8+	Ill
	F	4	0	+	+	+	0	0	0	5	4	Residua present
	M	2	0	+	0	0	0	0	Cortisone and X-ray	5	5	Ill

endotheliosis studied during the last eight years at the Hospital for Sick Children, Great Ormond Street. I have summarized these cases with the help of Dr. Constance Forsyth

and we have arranged them in three groups according to the usual clinical designations. Histological confirmation was obtained in the Letterer-Siwe and Hand-Schüller-Christian cases, and in 5 of the eosinophilic granulomas of bone. I am indebted to my colleagues at the Hospital for Sick Children for allowing me to quote certain of their cases.

The literature contains excellent clinical descriptions of the three classical types on the basis of the old eponyms, but often fails to describe how the total process of the disease evolves. Moreover, using the old nomenclature, it is difficult to classify atypical and intermediate cases: for example, a Christian triad appearing in an acute histiocytic reticulo-endotheliosis, or a histiocytic cerebral lesion causing diabetes insipidus in the absence of lesions in the skull bones, or a sudden increase in the *tempo* of a chronic case producing an acute and perhaps fatal flare-up.

The early lesions, whether osseous and focal, or disseminated, usually show a rather rapid development but any resolution which occurs is slow—an important clinical point which will be made again by Dr. Sutcliffe in his presentation of the radiological features.

Changes in the skin.—It is known that cutaneous signs may accompany the other manifestations but they may precede them. There may be erythematous patches, petechiæ or papules, but a macular rash is the most characteristic sign. Sometimes the macules are dark enough to suggest petechiæ but they blanch on pressure. In other cases they are small and pale and their centres are topped with a light scaling which makes them look shiny and yellow: a rash like this may indicate the diagnosis. These cutaneous changes may be seen on the scalp, face, trunk or buttocks. Skin biopsy is a ready method of diagnosis when skin lesions are present. The rashes may spread and come to resemble seborrhœic eczema; there may be irritation, scratching, serous discharge and secondary infection, followed by desquamation. Remissions and exacerbations of the "seborrhœic" condition are characteristic. After their resolution, cutaneous histiocytic infiltrations may leave behind multiple white scars, usually separate and spaced, or perhaps forming an alligator pattern.

Changes in the lungs.—In acute cases the appearances of miliary infiltration or reticulation may be seen in the X-ray, but the changes are sometimes much denser. When there is extensive histiocytic pulmonary involvement, considerable fibrosis of the lungs occurs and eventually *cor pulmonale* and failure of the right heart. Honeycombing of the lungs is another possibility; the pathogenesis of this is not clear except that it may be associated with other types of infiltration of the pulmonary supporting tissue (Oswald and Parkinson, 1949), and spontaneous pneumothorax may occur. Extensive pulmonary changes are more likely in infants with acute histiocytic reticulo-endotheliosis but they have been described in adult cases as well.

Prognosis.—Cases of the Letterer-Siwe type are often fatal, although spontaneous recovery is possible. Recovery was spontaneous in the first patient listed in Table I (Lightwood and Tizard, 1954); recovery was apparently induced by means of cortisone in the third case in Table I (Cox, 1953). Transitions from an acute stage to a chronic disseminated type of disease may occur (Lichtenstein, 1953).

The type of disease called *eosinophilic granuloma of bone* has a strong tendency to heal spontaneously (7 out of 8 cases in Table I), but occasionally a case may change into the Hand-Schüller-Christian syndrome. The last-named syndrome usually follows a chronic course although, as age increases, there is a tendency for the process to become arrested. There is, however, the possibility of exacerbations, perhaps not until adult life, when there may be a sudden increase in the *tempo* of the disease. It is interesting that each of the main three clinical types has been reported in adults, as well as intermediate types.

The results of treatment with X-rays, ACTH or cortisone are quite unpredictable and we have no certain curative treatment.

Conclusions.—In a disease with such diverse clinical manifestations there is no *sine qua non* for its diagnosis. For example, it is known that skeletal defects may be entirely absent in cases showing glandular, pulmonary or cutaneous manifestations. The only essential finding is the presence of the characteristic histiocytic process in the affected tissues and the diagnosis can turn on the selection of the correct anatomical site for obtaining material for biopsy. Therefore other diagnostic tests need to be found.

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Dr. Martin Bodian:

Survey of the Pathological Features of Hand-Schüller-Christian Syndrome, Letterer-Siwe Disease and Eosinophilic Granuloma of Bone

General observations.—A review of the lesions in 16 cases from the Hospital for Sick Children, London, has produced evidence that Hand-Schüller-Christian syndrome, Letterer-Siwe disease and eosinophilic granuloma of bone are clinical variants of the same pathological process and that there is no consistent correlation of the various pathological features with the clinical grouping.

The basic lesion found in this group of disorders is a proliferation of histiocytes which appears to be neoplastic rather than reactive in kind. The histiocytes have ample eosinophilic cytoplasm, sometimes granular or vacuolated, with clearly defined cell margins or else showing a syncytial arrangement. One finds frequently multinucleate giant forms with even 50 or more nuclei. The nuclei of the histiocytes are rather characteristic in that they are large, pale, vesicular, strikingly resembling blood monocytes. The nuclear shapes may be ovoid, round, lunate, horseshoe or convoluted with a grooved or wrinkled appearance of the nuclear membrane. More primitive cells, "pro-histiocytes" and reticulum cells contain a strikingly eosinophilic nucleolus. Mitosis is uncommon except in rapidly progressive cases. Parts of the lesions frequently undergo necrosis except in the skin, with resultant liberation of fat which is taken up by the histiocytes producing a vacuolated appearance in paraffin-embedded sections. Erythrocytes and iron pigment may also be engulfed by the histiocytes (erythrophagocytosis and siderosis). Inflammatory cell infiltration with eosinophil polymorphonuclear leucocytes, and to a lesser degree with neutrophils, lymphocytes and plasma cells is common. There is a variable degree of reticulin and collagen formation; in some instances reticulin fibrils form a close network around individual histiocytes, whilst in others they appear to proliferate from blood vessels and enclose groups of cells.

The features of pathological lesions according to site.—The reticulo-endothelial system includes cell groups mainly in the bone-marrow, lymphoid tissues, liver, lungs and skin; any one or several of these organs are therefore the principal sites of the proliferative processes of histiocytes which are specialized reticulo-endothelial cells (histiocytosis).

The lesions developing in the bone-marrow usually result in clear-cut areas of bone destruction which are often of irregular contour in the skull, but rounded or ovoid in other bones (vertebræ, ribs, pelvis, long bones: mainly femora and humeri). In addition to evidence of bone resorption there is often new bone formation indicating attempts at healing. Extensive diffuse histiocytic infiltration of the bone-marrow may also occur without any bone absorption.

FIG. 1.—Acute diffuse histiocytosis, showing hepatosplenomegaly, the nodular enlargement of the thymus and a maculopapular skin rash.

FIG. 2.—Acute diffuse histiocytosis, showing cervical lymphadenopathy and miliary infiltration of the lungs.

The lymphoid tissues (thymus, spleen, lymph nodes) manifest a medullary proliferation with more or less complete destruction of the normal architecture and enlargement of the affected structures (splenomegaly, lymphadenopathy, characteristic nodular enlargement of the thymus).

Within the liver there is multicentric histiocytic proliferation chiefly limited to the portal zones. The infiltration may lead to obstruction of the portal bile ducts with secondary biliary cirrhosis.

Pulmonary lesions are also multifocal in nature, and consist of interstitial and peribronchial cellular infiltration producing miliary shadows on radiological examination. Damage to the bronchial walls with resultant dilatation of bronchi or else necrosis of the abnormal tissue with cavitation may result in gross cystic changes in the lungs (radiological appearances of "honeycomb" lungs). The lung lesions may also undergo fibrosis.

The skin lesions consist almost exclusively of areas of histiocytic proliferation with hardly any inflammatory cell infiltration and without evidence of necrosis.

The variations in histological structure in relation to clinical manifestations.—The histological lesions in Hand-Schüller-Christian disease (originally established as comprising skull defects, exophthalmos and diabetes insipidus) have been conventionally considered to consist principally of xanthoma cells, and many authors have classified this disease process as a disorder of lipoid metabolism.

Letterer-Siwe disease, on the other hand, showing a widespread involvement of the reticulo-endothelial system and usually running an acute and fatal course in very young

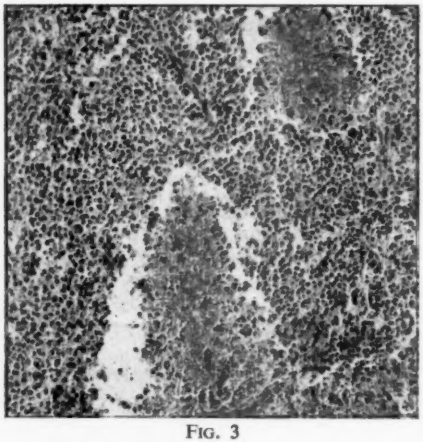

FIG. 3

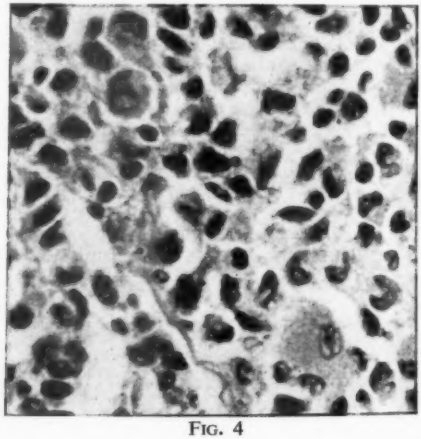

FIG. 4

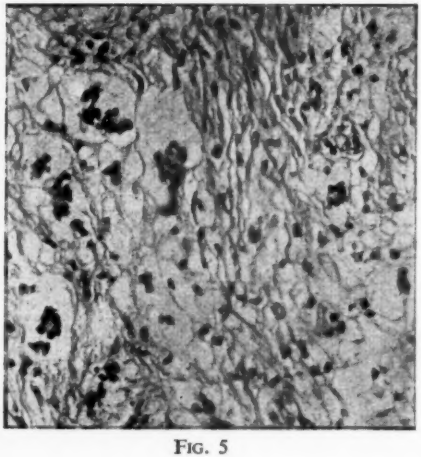

FIG. 5

FIG. 3.—Photomicrograph of the thymus. ×90, showing diffuse histiocytic and inflammatory cell infiltration, with areas of necrosis.

FIG. 4.—Photomicrograph of thymus, ×470, to show the pleomorphic cell picture of histiocytic infiltration.

FIG. 5.—Photomicrograph of a subdural lesion. ×220, showing foam cells including some Touton foam cells and fibrification of the lesion.

children, is known as "non-lipid reticulosis"; the conventional conception of the histological picture is of a diffuse histiocytic proliferation without foam cells, with very little inflammatory cell infiltration and minimal—if any—necrosis.

Finally eosinophilic granuloma of bone with solitary or multiple focal bone lesions is conventionally considered to show lesions of histiocytic proliferation with considerable eosinophil leucocytic infiltration, necrosis, lipid phagocytosis and fibrification.

A careful perusal of the histological material from all the cases of this group of histiocytoses at the Hospital for Sick Children, Great Ormond Street, has clearly shown that these clinico-pathological definitions are no longer tenable. Several of the cases showed considerable variation in the histological types of lesions according to sites examined: one child in particular showed the non-lipid reticulosis type of lesion in the skin, eosinophilic granuloma in the spleen, foam cells with Touton giant cells in the subdural tissue and fibrous nodules in the lungs. It seems that so-called "xanthomatous" lesions are not essentially different from the non-lipid type of histiocytosis or from the so-called eosinophilic granuloma of bone, and that these are simply stages in the evolution of a single type of lesion—the histiocytosis.

The pathogenesis of the lesions.—In considering the nature of the process under discussion, consideration must be given firstly to the possibility that it is a reactive state to infection. Some children suffer in fact from minor mucosal infections of various kinds but these simply result from the involvement of the reticulo-endothelial system with disturbance of the normal protective mechanisms. Many of the children in question show no evidence whatsoever of any infective process preceding or accompanying the disease process.

Secondly it has been suggested that an error of metabolism, a xanthomatosis, is responsible for Hand-Schüller-Christian disease in particular. The occurrence in some cases of histiocytic foci without fat and the absence of a uniform reticulo-endothelial response render this hypothesis untenable.

Finally, consideration is given to the neoplastic theory: it is highly probable that these syndromes are examples of histiocytic neoplastic processes, varying from solitary or multiple focal lesions running a benign course, over a range of intermediate stages to a diffuse and frankly malignant disorder of the reticulo-endothelial system.

Dr. John Sutcliffe:

The radiology of eosinophilic granuloma, Letterer-Siwe disease and Hand-Schüller-Christian disease is mainly concerned with the lesions of bone and lung although there may also, in some cases, be radiological evidence of enlargement of the thymus, the liver and spleen and possibly of mediastinal glands.

The bone lesions encountered in the three diseases are probably indistinguishable radiologically but the rarity of the diseases makes it difficult to assemble a sufficiently large number of cases to see if there are any differences within the group. There does not seem to be any difference in the distribution of the lesions throughout the skeleton. In each disease the skull is frequently involved and other bones commonly affected are the ribs, vertebræ, pelvis and the larger long bones. So far as I am aware no case has been described with bone lesions in the hands or feet.

The X-ray appearance of the skull lesions of Hand-Schüller-Christian disease is well known and skull involvement in eosinophilic granulomata and Letterer-Siwe disease produces the same appearance. The lesions show as clear-cut areas of bone destruction, round or oval in shape, or, when larger, with polycyclic or geographical outlines. They may be single or few in number, or they may be very numerous when they are of varying size and shape (Fig. 1).

FIG. 1.—Hand-Schüller-Christian syndrome.

There is usually complete destruction of the diploe and of both inner and outer tables of the skull, so a completely clear sharply demarcated translucent area is seen in an X-ray film. There is usually no surrounding increase of bone density and this, if present, is ill-defined, fading gradually into the normal bone pattern.

The base of the skull is, of course, not infrequently involved, but diabetes insipidus may occur in the Hand-Schüller-Christian group without any radiological evidence of bone involvement near the pituitary fossa.

The mandible may be affected. If the area of destruction surrounds a tooth socket the odd X-ray appearance of a tooth floating free in space, may result (Fig. 1). It is no surprise that the teeth sometimes fall out.

A few points in differential diagnosis of the skull lesions may be mentioned. In practice, when one of this group of diseases is suspected and a skull X-ray is examined there may be difficulty in deciding if a translucency is of significance or not. The regions in which the skull is normally very thin are readily recognized and fade gradually into thicker parts of the vault. Localized translucencies 1 cm. or so in diameter may be produced by pacchionian bodies but not until late in childhood. They are usually near the mid-line and only involve the inner table of the skull. Diploic venous lakes can produce fairly large demarcated defects but the inner and outer tables are usually intact so the translucent area is not nearly so clear as in these diseases. Moreover, the impression of the draining vein can be seen leaving the defect. If there is real doubt about the significance of a small translucency it may well be worth waiting a week or so and then taking further films to see if there is any change, for an eosinophilic granuloma can destroy a really large area of bone in three or four weeks' time.

Dermoid and epidermoid cysts produce translucencies which are consistently outlined by a thin white line of increased density.

Resorption of bone may sometimes take place under a subperiosteal hæmatoma. This seems to be a rare event but is perhaps worthy of note in view of the frequency with which trauma precedes the development of an eosinophilic granuloma. Most of the conditions in which there are localized skull defects are readily distinguishable from the diseases under consideration both clinically and radiologically.

The lesions of the long bones are radiologically more varied and less distinctive than those in the skull. They may affect any part of the diaphyses but are rather more common near the metaphyses. Involvement of an epiphysis is unusual. When small, the lesions again appear as round or oval, clear-cut areas of bone destruction in the interior of the bone.

Larger lesions can be seen to be cutting away the inner aspect of the cortical bone so that this is thinned. There is often expansion of the shaft (Fig. 2). Sclerosis surrounding the

FIG. 2.—Letterer-Siwe disease.

FIG. 3.—Eosinophilic granuloma. This child later developed the Hand-Schüller-Christian triad.

area of destruction is more common in the long bones than in the skull. It may appear as a thin white line or as a more widespread increase of density. Sclerosis may be seen in rapidly fatal cases of Letterer-Siwe disease as well as in more chronic cases.

When the lesion penetrates the cortical bone, periosteal new bone is laid down in a layer or layers parallel to the corticalis and often extending over a large part of the shaft. These layers of periosteal new bone may give the "onion peel" appearance (Fig. 3) which in the past has been associated particularly with "Ewing's tumours".

This appearance of extensive bone destruction with widespread periosteal new bone formation seems to be particularly associated with actively growing eosinophilic granulomata. It may give rise to fears of a malignant tumour. There is no destruction of the newly formed bone, no spicular periosteal new bone formation at right angles to the shaft and a large clear circumscribed area of bone destruction can be seen to be the main feature of the lesion. The prognosis of a solitary eosinophilic granuloma with florid X-ray changes appears to be just as good as in other cases. The other conditions which most frequently arise in the differential diagnosis are a low-grade osteomyelitis and bone cysts or localized fibrocystic disease. Biopsy is necessary to establish an exact diagnosis, particularly in solitary lesions.

Pathological fracture of long bones is an obvious possibility with these large destructive lesions but does not seem to be at all common in childhood. There has been only one lesion of this type in the Great Ormond Street cases. This was in the boy whose X-ray of hip is shown in Fig. 3. During a period in which the boy was up and about, separation of the femoral head from the upper end of the shaft took place leading to the appearance of a slipped epiphysis.

Two of the Great Ormond Street cases with multiple eosinophilic granulomata have shown collapse of a vertebral body of the type described as vertebra plana (Fig. 4). It

FIG. 4.—Vertebra plana in a child with multiple eosinophilic granulomata.

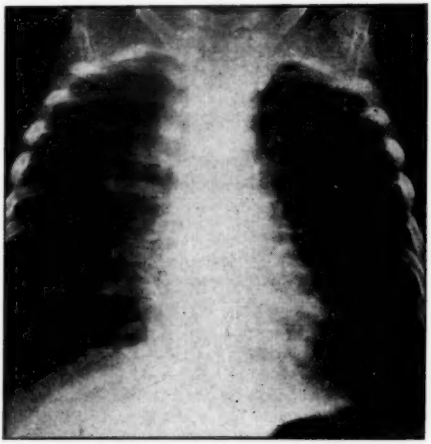

FIG. 5.—Letterer-Siwe disease with honeycomb lungs and enlargement of the thymus.

seems certain that many of the previously unexplained cases of vertebral collapse of this type described as Calvé's disease and believed on very flimsy evidence to be due to osteochondritis of the vertebral body have in reality been due to eosinophilic granulomata or to Hand-Schüller-Christian lesions. Certainly, if collapse of this type is discovered, the rest of the skeleton should be X-rayed. The diagnosis in one of our cases was first realized, several years ago, when an X-ray of cervical spine taken because of a stiff neck, happened to include a part of the skull in which typical bone defects could be seen. Almost complete reformation of the vertebral body took place—but not until several years had gone by.

There have been two cases, one a solitary eosinophilic granuloma, in which destruction has been confined to the spinous process and neural arch without affecting the body of the vertebra.

The X-ray appearance of rib lesions is often characteristic as there is a localized expansion of the bone in which a clear area of destruction can be seen outlined by a thinned layer of cortical bone.

In addition to these various localized lesions, generalized bone decalcification has been described in Letterer-Siwe disease. It is always difficult to be sure of generalized decalcifica-

tion unless this is very marked and it has not been noticeable in any of the Great Ormond Street cases.

Chest X-rays are frequently illuminating in these diseases as they may show lesions of ribs or other bones, lung disease, enlargement of the thymus and perhaps enlarged mediastinal glands.

The lung lesions produce radiological patterns of two main types, miliary mottling and honeycomb lungs. There have been 3 cases at Great Ormond Street, 2 of Letterer-Siwe disease and 1 with multiple eosinophilic granulomata of bone, which have been thought to show miliary mottling but this has been rather indefinite.

It should be remembered that a child acutely ill with Letterer-Siwe disease may have a segmental or lobar pneumonia in addition to miliary lesions, giving an X-ray picture which may be mistaken for a primary tuberculous complex with miliary dissemination. Also it may not be possible to decide if small shadows represent areas of specific infiltration or are due to a coincidental bronchopneumonia. Miliary mottling is very rare in infants other than in miliary tuberculosis, Letterer-Siwe disease and idiopathic hæmosiderosis.

There has been one child with honeycomb lungs (Fig. 5), a fatal case of Letterer-Siwe disease, in which at autopsy the lungs were found to be riddled throughout with small cysts. Spontaneous pneumothoraces have been described in cases of honeycomb lungs in Letterer-Siwe disease as well as in Hand-Schüller-Christian disease. The honeycombing becomes much more obvious in the partially collapsed lung beneath a pneumothorax. There was no pneumothorax in the Great Ormond Street case but shortly before death the child developed emphysema of the mediastinum and neck.

Mediastinal gland enlargement of sufficient size to be visible radiologically has not occurred in any of our cases and does not seem to be a common feature of these diseases.

The thymus is sometimes enlarged as it was in the case with honeycomb lungs (Fig. 5).

Lastly, I would mention three diseases to be kept in mind when a case is clinically obscure and a chest X-ray shows generalized changes. These are Letterer-Siwe disease, miliary tuberculosis and fibrocystic disease of the pancreas. It may be very difficult to decide, particularly if the films are not of the highest quality, whether one is dealing with miliary lesions, honeycomb lungs or the lung changes associated with pancreatic fibrosis.

I am indebted to members of the staff of the Hospital for Sick Children for permission to publish the pictures of their cases.

Mr. G. H. Macnab:

4 *Cases of Eosinophilic Granuloma were demonstrated. 2 only are described here.*

Case I.—J. B., female, aged 1 year 5 months (born April 1952).

History.—First seen 14.9.53. Presented with a swelling of the left upper eyelid which had been there for six weeks. The swelling was preceded by the presence of septic spots in relation to both lower eyelids. The swelling of the left upper eyelid increased in size until the eye was closed, but there was little discomfort associated with the swelling, and there was no history of fever. Six months before the swelling had appeared, the child had fallen on the back of her head and a hæmatoma had developed which had had to be evacuated following incision.

On examination.—There was a firm, well-defined, smooth swelling in the centre of the left upper eyelid, which appeared to be attached to the orbital margin. A deficiency in the bone of the orbital margin could be palpated. There was restriction of movement of the left upper eyelid, but the movements of the left eye were free. There was no evidence of sepsis in relation to the face, mouth or antra. The cervical glands were palpable on each side of the neck. The liver could be felt one fingerbreadth below the right costal margin. The spleen was not palpable.

Investigations.—X-ray showed an area of bone destruction with some new bone formation along the left orbital margin. Hb 93%, W.B.C. 6,000, neutrophils 55%, lymphocytes 45%. Biopsy was carried out. The pericranium was intact, but, on incision of this, gelatinous, necrotic material was curetted out from the bony defect.

Pathology.—Microscopy: The tissue was highly cellular and pleomorphic. Most of the cells were reticulum cells. Some mononuclears were present and other multinucleate giant forms seen. Many of these cells had a foamy cytoplasm and contained neutral fats, but no doubly refractile cholesterol. There were many polymorphonuclear neutrophil leucocytes present, and also eosinophil leucocytes in somewhat lesser numbers. There was no evidence of fibrosis. The cytological appearances supported the diagnosis of eosinophilic granuloma.

Progress.—Further X-rays taken showed numerous defects in the skull, the appearance being that of a reticulosis, ? eosinophilic granuloma. The lung fields were clear, but there were some areas of bone destruction in relation to the 5th, 6th and 7th ribs. There were no deposits elsewhere in the skeleton.

One year later, 10.9.54, skull normal, ribs normal. The child has perfect health and the swelling over the left upper eyelid has disappeared.

The only active treatment carried out in this case was curettage of the necrotic material over the left orbital margin.

Case II.—V. T., female, aged 2 years 1 month (born 8.10.50).

History.—Admitted 21.11.52. For nine to ten weeks parents had noticed stiffness in the neck associated with inclination of the head towards the right. Child did not flex the head when bending down to pick up articles. The rest of the spine appeared normal. Was able to talk and run normally but cried if jolted. The neck stiffness had been gradually increasing. No obvious malaise was noted but off food for six weeks. No history of vomiting. Apart from a few upper respiratory infections she had been perfectly healthy. No infectious disease.

Family history.—Non-contributory.

X-rayed at the Victoria Hospital, Lewes: the films showed partial destruction of the axis vertebra with forward subluxation of the atlas and axis on C.3. Radiologist's opinion on the film was that the lesion was a sarcoma. Child was put into a collar splint as it was felt that any sudden flexion of the head could easily prove fatal.

On examination.—Right torticollis and stiffness of neck. No evidence of paraplegia.

Investigations.—Full blood count, nil significant. E.S.R. 22 mm. in one hour. Mantoux negative.

Radiotherapist considered that the diagnosis of sarcoma was probable, but that the tumour might belong to one of a group of tumours of xanthomatous type.

Neurosurgeon suspected an extradural malignant tumour and thought that any surgical intervention was an unjustifiable risk.

Needle biopsy was carried out under anæsthesia, and a Minerva plaster jacket applied.

Result of biopsy was inconclusive; showed only inflammatory reaction.

Operation.—Carried out through a window in the plaster. Soft tumour removed from the region of the second cervical vertebra, and also a small piece of bone which appeared to be sequestrated.

Pathology.—In the biopsy specimen there were aggregates of large foamy cells, some of these were bi- and multi-nucleate. A small number of eosinophil and neutrophil leucocytes were also present. There was no evidence of necrosis. Foam cells contained fine droplet fat but no doubly refractile cholesterol. The appearances indicated the diagnosis of subacute or chronic eosinophilic granuloma, not yet showing the full picture of Hand-Schüller-Christian disease as there were fat droplets and no fibrosis present.

Progress.—Four months later X-rays showed a recalcified and apparently normal axis vertebra. Movements of neck were free and there was no evidence of disease in the cervical vertebræ. X-rays of skull and skeleton showed no evidence of disease.

Comment.—In the 4 cases of eosinophilic granuloma that I have demonstrated (namely: I. Involving skull and ribs, II. Involving cervical spine, III and IV. Involving the femur) the diagnosis of sarcoma of bone could not be excluded in three out of the four cases until a biopsy was carried out. It was noted in one case where needle aspiration was tried that the result was inconclusive and showed only inflammatory reaction. That means that where the lesion is a single one surgery is indicated, to curette out the gelatinous necrotic material and to present sufficient material for accurate diagnosis.

All true cases of eosinophilic granuloma of bone heal by recalcification and new bone formation. There is no doubt that eosinophilic granuloma runs into Hand-Schüller-Christian disease and Letterer-Siwe disease. In Cases II, III, and IV, re-calcification and normal bone formation were present within six months. In Case I, involving skull and ribs, healing was complete within one year.

In benign forms of histiocytosis deep X-ray therapy does not seem to play an effective part.

The prognosis is good if there is radiological evidence of response to curettage within the first six months of the diagnosis being established. If there is more than one bony defect in the skull the condition tends not to undergo a natural cure.

Dr. I. G. Williams: The cells which characterize this group of diseases are all highly radiosensitive. The role of radiotherapy has been in the control of local masses and moderate doses are sufficient to cause regression of these tumours. Radiotherapy is in no way a curative agent, but any tumour mass which is causing disfigurement or pain should be treated, and I believe it is one of the most powerful agents we have at our disposal—it can be used thus in Hand-Schüller-Christian disease. In eosinophilic granuloma the indications are the same, but here it can be used especially in isolated lesions as an alternative to surgery. The control of a large local lesion may allow sufficient time for the body to deal with the smaller more scattered foci. It can also be used for irradiation of the pituitary, and patients so treated have gradually lost the need for Pitressin injections, but there is a danger here of pituitary insufficiency due to the disease and irradiation.

Dr. H. Parry Williams referred to the case of a child of 13 months in whom the diagnosis of tuberculous osteitis cystica was originally made; but subsequently both clinically and at post-mortem a diagnosis of Letterer-Siwe disease was fully established. He pointed out that the first condition should be considered in the differential diagnosis.

Dr. N. Hajdu:

A case of reticulo-endotheliosis (histiocytosis) with extensive pulmonary involvement showed marked initial response of the lung infiltration to incidental X-radiation.

Male child, born 9.9.48. Rash on chest at age 4 months.

Persistent cough from age 15 months. First attended Victoria Hospital for Children at 20 months for papular rash on trunk. A routine radiograph of the chest showed fine uniform pseudo-miliary mottling against a hazy background in both lung fields interpreted as a manifestation of reticulo-endotheliosis. Skin biopsy at this stage showed subepidermal infiltration with cells of varying types; the predominant cell was a large darkly-staining histiocyte. On subsequent chest X-rays a symptomless osteolytic lesion was discovered in the right scapula, which increased rapidly during the following months (Fig. 1). The biopsy material consisted of a granulomatous mass of large histiocytes infiltrated with eosinophils and other migratory cells. Between 25.10.50 and 1.11.50 a dose of 6 × 200 r (measured at the skin) was delivered to the scapula through a single posterior field 8 × 10 cm. in diameter. On 22.11.50 the right lung was clear and in marked contrast to the hazy left lung (Fig. 2). There is no doubt that scattered radiation was sufficient to produce temporary retrogression of the infiltration.

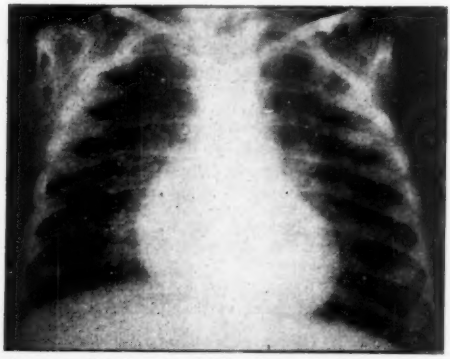

FIG. 1.—Histiocytic infiltration of both lungs. Eosinophilic granuloma of the right scapula.

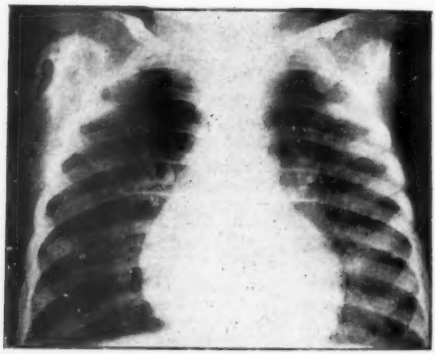

FIG. 2.—Right lung field clear following deep X-ray to right scapula.

Encouraged by this result wide field irradiation of the chest (6 × 20 r) was undertaken in May 1950, but failed to produce comparable improvement. In the meantime multiple osteolytic lesions appeared in the cranial vault and base. Progress was halted by deep X-ray, but no re-ossification occurred. Death ensued at age of 3 years 3 months in congestive heart failure from cor pulmonale. The ante-mortem condition of the lung is shown in Fig. 3.

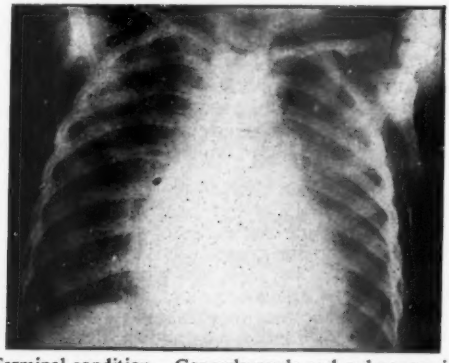

FIG. 3.—Terminal condition. Cor pulmonale and pulmonary infiltration.

Autopsy findings of the lung revealed tremendous thickening of the alveolar walls with large histiocytes few of which contained lipoid. Sections from the side of the pituitary fossa and from the dura showed yellow tissue consisting of histiocytes with foamy cytoplasm.

The case also illustrates the nosological unity of the various conditions discussed at this meeting which are but stages of the same disease process.

Section of Radiology

President—J. F. BROMLEY, O.B.E., F.R.C.P.

[*January* 21, 1955]

DISCUSSION ON THE PATHOLOGY AND TREATMENT OF FUNCTIONING OVARIAN TUMOURS AND OTHER UNUSUAL GROWTHS OF THE OVARY

Dr. C. W. Taylor (Director of Pathology, The Birmingham and Midland Hospitals for Women, United Birmingham Hospitals):

The Pathology and Histogenesis of Special Ovarian Tumours

The ovary is a common site of neoplasm. Certain primary tumours of the sex gland are associated with endocrine abnormalities—so-called "Functioning ovarian tumours". The effects are mainly of feminizing or masculinizing type. Tumours of similar histogenesis, though not associated with endocrine dysfunction, and tumours originally, but wrongly, thought to be of functional type, are usually discussed in the same context under the heading "Special and functioning ovarian tumours".

Incidence.—From a ten-year study of cases of primary ovarian neoplasm at the Women's Hospital, Birmingham, the following figures were obtained (Taylor, 1950):

Simple neoplasm ..	600	74·2%
Malignant neoplasm ..	171	21·2%
"Special" group ..	37	4·6%
Total	808	

The tumours classified under this "Special" group were:

Granulosa cell tumour	18
Theca cell tumour	7
Arrhenoblastoma	3
Dysgerminoma	3
Brenner tumour	6
Total	37

The special group of tumours under consideration were not classified as simple or malignant at that time. The cases have been followed up and the findings will be referred to later by Dr. Blomfield. The theca cell and Brenner tumours are essentially benign. Histological examination of the others will not, in many cases, give an answer to the degree of clinical malignancy.

Histogenesis.—It is necessary to consider the embryological development of the ovary. Fig. 1 shows an over-simplified schematic representation of the relation of certain of the tumours to structures seen in the developing ovary. It must be emphasized, however, that most of the tumours probably arise from undifferentiated cells. These cells may produce tissues of either testicular or ovarian type. In tumour formation the development may be bizarre. We may thus find primitive cells and differentiated structures of either or both gonads in the same neoplasm.

Fig. 1 simply serves to illustrate how the differentiated neoplasm contains tissues similar to those seen in normal gonadogenesis. It also emphasizes the common origin of ovary and testis.

FEMINIZING TUMOURS

Granulosa cell tumour.—Gross examination usually shows a solid tumour of moderate size with a smooth surface. Great variation in size has been recorded. The cut surface often shows small cystic spaces and areas of hæmorrhage in a soft, succulent, slightly yellowish tumour mass.

Microscopy shows the tumour to consist of closely knit, uniform, darkly staining cells typical of the granulosa layer of the ripening ovarian follicle. The most characteristic

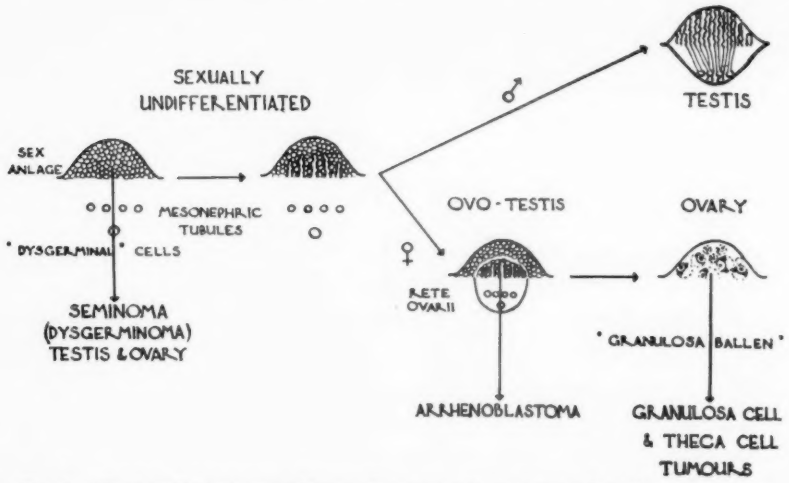

FIG. 1.—Chart to illustrate resemblance of tumour cells to phases of ovarian development. Tumour origin is probably always from primitive cells.

pattern reproduces the Call-Exner bodies of the granulosa with small cystic spaces—the so-called microfollicular type (Fig. 2). The tumour cells, however, may be arranged in cylindroid or adenomatous formations or be of diffuse type. The picture can thus resemble carcinoma or even sarcoma but the uniformity and resemblance to typical granulosa cells help in differentiation.

The malignancy of these tumours is variable. When spread occurs it is often local, such as omentum, and may not appear for many years after removal of the primary growth. Generalized early spread, may, however, be seen.

Theca cell tumour.—Gross examination usually shows a small, firm, yellow tumour, though large neoplasms are occasionally seen. The cut surface shows the yellow tumour to be very firm and suggestive of connective tissue origin.

Microscopy shows a finely set connective tissue tumour of benign type. Lipoid can be demonstrated by special stains. Clusters of cells of granulosa type are often present.

Theco-granulosa cell tumours.—Mixture of granulosa cell and theca cell elements are often seen in the same tumour. In view of the histogenesis this is to be expected and the feminizing effect of both of these tumour types is similar. Some authorities prefer to use the combined term for any tumour of this type rather than to differentiate into granulosa or theca cell varieties.

Luteinization of the granulosa cells may occur, usually in groups of cells rather than the whole tumour mass.

Associated pathology.—The feminizing tumours are frequently associated with uterine pathology. Fibromyomata are common. The uterine endometrium classically shows marked cystic glandular hyperplasia. The finding of such endometrium in curettings from a woman well past the menopause may suggest the presence of such a tumour.

The coincident development of carcinoma of the body of the uterus has been much discussed in the literature. The quoted incidence varies from 3·0 to nearly 15·0% (Emge, 1953). From my own material of 52 cases of feminizing ovarian tumour, carcinoma of the endometrium was present in 6 cases, an incidence of 11·5%.

Masculinizing Tumours

These are of two main types—arrhenoblastoma and lipoid cell tumour.

Arrhenoblastoma is an ovarian tumour containing structures suggestive of testicular origin.

Gross appearance is usually that of a solid tumour of moderate size, though large tumours have been recorded. The cut surface may show small cysts; the solid areas are firm and greyish in colour.

Microscopy varies according to the differentiation of the tumour. In the *well-differentiated*

type (testicular adenoma) well formed tubules of testicular type are seen, often with interstitial cells (Fig. 3). In the *partly differentiated* type, abortive tubule formation may be seen but most of the tumour is cellular, sometimes containing masses of interstitial cells. In the *undifferentiated* type, a cellular tumour is seen with little or no distinguishing feature, and may resemble sarcoma.

Malignancy is variable and probably can be correlated to some degree with the histological picture.

Lipoid cell tumours.—These tumours are rare but form a well-recognized group. They are usually small and are yellow in colour. They are less firm than the theca cell tumour.

Microscopy varies according to the type of cell which constitutes the tumour mass. In the *adrenal-like tumour* the picture mimics that of adrenal cortex (Fig. 4). In *hilus cell*

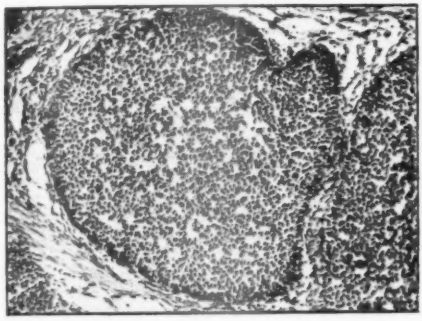

FIG. 2.—*Granulosa cell tumour.* Microfollicular type with characteristic Call-Exner bodies. (×75.)

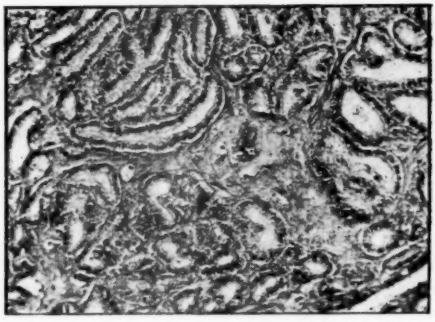

FIG. 3.—*Arrhenoblastoma.* Differentiated tubular type (testicular adenoma) with interstitial cells in the central mass of stroma. (×75.)

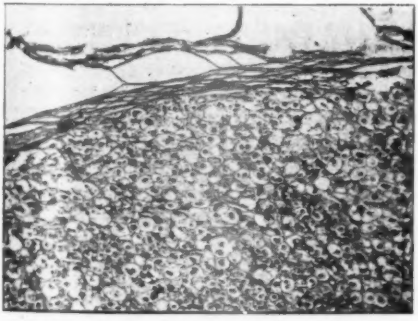

FIG. 4.—*Lipoid cell tumour* of adrenal-like type. (×75.)

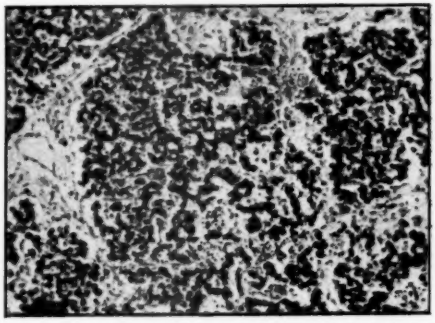

FIG. 5.—*Dysgerminoma.* Pleomorphic cellular neoplasm with clusters of lymphocytes in the stroma. (×75.)

tumour the cell features are similar to those seen in characteristic cells found at the hilum of the normal ovary. In *Leydig cell tumour* the cells are thought to be derived from the interstitial cells of the testis.

Some authorities consider the hilus cells of the ovary to be extra-testicular Leydig cells. Hilus cell and Leydig cell tumours may thus be identical. Reinke crystalloids which are present in certain phases of development in the interstitial cells of the testis can at times be demonstrated in the tumour cells.

Gynandroblastoma is a term used to describe a tumour containing both ovarian and testicular elements. Such tumours are rare but serve to show that the histogenesis of the functioning tumour relates to cells of primitive undifferentiated type. These cells have the potentiality of developing into either ovarian or testicular tissue as shown in Fig. 1.

Dysgerminoma is similar to seminoma of the testis.

Gross appearance is that of a solid neoplasm, sometimes large in size. The cut surface shows a homogeneous, rather soft, neoplasm, often grey in colour with a yellowish tinge.

Microscopy shows a cellular neoplasm of apparently malignant type. The cells tend to be arranged in alveolar formation, are pleomorphic and often show mitosis. The supporting stroma is quite variable in amount and characteristically contains abundant small lymphocytes (Fig. 5).

Although the histological picture is that of a malignant tumour, as in seminoma, not all of them behave clinically in that way.

Brenner tumour was originally thought to be of the functioning type of tumour. Gross appearance is similar to that of fibroma but histological examination shows solid epithelial cell masses in the fibrous stroma. The tumour is essentially benign.

Struma ovarii, a tumour composed of thyroid tissue, is usually regarded as an overgrowth of such tissue in a teratoma. Thyrotoxicosis has been recorded but usually there is no obvious hormonal effect.

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Dr. G. Douglas Matthew (Senior Lecturer, Department of Obstetrics and Gynæcology, University of Edinburgh):

Œstrogenic Tumours of the Ovary: Clinical Features

If we accept the description of von Kahlden published in 1895 as being the first authentic case of granulosa cell tumour then our present-day knowledge of this unusual neoplasm of the ovary has been gained by the cumulative experience of sixty years. Von Werdt supplied the term "granulosa cell" in 1914 and with the later recognition and addition of the thecoma, the group of so-called feminizing tumours of the ovary was created. It would appear that, for the first thirty years of this century, few examples of this tumour were recognized, for when Lepper, Baker and Vaux presented their paper to this Society on March 18, 1932, they were able to record only 40 cases previously published. To this number they added a further 7, 1 recent and 6 diagnosed in retrospect. At that time the association of granulosa cell tumour and menstrual disorders was appreciated but the connecting link between the two was yet to be established. In 1937, Pratt found 200 cases described in the literature and by then there was considered to be increasing evidence to prove that these tumours were responsible for the production of œstrin. Since that date there has been an ever-increasing flow of papers on this subject and these, collectively, have succeeded in establishing a fairly clear-cut picture of the clinical features but have failed to achieve unanimity in regard to certain other fundamental aspects. Thus, controversy still reigns over such matters as histogenesis, hormonal activity of the granulosa and theca cell, radiation effects upon these cells, malignancy, co-existence with endometrial carcinoma and the carcinogenic effect of the œstrogens.

As yet it is not easy to state precisely the incidence of this variety of tumour in relation to all tumours of the ovary. Novak (1953) has stated that functioning tumours account for some 10% of all primary solid malignant growths of the ovary and a rough estimate is that they represent 1 to 2% of all ovarian tumours. This means that the discovery of such a tumour as a clinical entity, by the individual gynæcologist, is still associated with the interest and fascination of a curio. As I can boast of no unique clinical experience in this field, I find myself in the role of a collector of curios. The collection which is utilized as a basis for this paper is that accumulated over the past seventeen years in the Department of Obstetrics and Gynæcology of the University of Edinburgh and consists of 43 cases of œstrogenic tumours of the ovary. Quite recently many of the specimens have been re-examined by Salvatore, of Brazil, temporarily working in the Department. During his study, many fresh sections were prepared and examined and, in the final analysis, the distribution of the material is 25 cases of granulosa cell tumour, 9 cases of thecoma and 9 cases of combined granulosa cell and theca cell tumour, a group which Novak has suggested recently might be termed granuloso-thecoma.

CLINICAL FEATURES

(1) *Age.*

It is well known that œstrogenic tumours of the ovary may occur at any age and it is customary to group cases into three age periods, pre-puberty, during the child-bearing

period and after the menopause. Unfortunately this series contains no cases in the first group for such specimens would be dealt with elsewhere but I understand that no case in this category has been examined by the pædiatric pathologists in Edinburgh during the past twenty years. Of the 42 cases in which the age was known the distribution was as follows:

Age group	20–29			30–39			40–49			50–59			60–69			70–79			80–89		
Tumour	G	T	C	G	T	C	G	T	C	G	T	C	G	T	C	G	T	C	G	T	C
No. cases	3	0	1	6	0	2	3	0	3	5	3	0	8	3	2	0	1	1	0	1	0

G=Granulosa, T=Thecoma, C=Combined.

In keeping with other published figures, the majority of cases (24) occur from the age of 50 onwards. The maximum incidence was in the age group 60 to 69 years which contained 13 cases and the oldest patient in the series was 86 years.

Case B.3458.—Aged 86. Para-5. Menopause at 50 years.
Symptoms: Irregular bleeding for one year and abdominal pain for two weeks.
Findings: Thecoma of right ovary, size of fœtal head. Myometrial and endometrial hyperplasia.

(2) *Symptoms.*

Generally speaking the symptoms arising from œstrogenic tumours of the ovary will depend upon the age of the patient, the œstrogenic effects of the tumour, the size of the tumour, the nature of the tumour, whether benign or malignant, and any complication such as torsion of the pedicle or rupture. Additional symptoms may be present due to a co-existing condition such as endometriosis, fibroids, carcinoma of the breast or carcinoma of the endometrium.

(*a*) *Disorders of menstruation.*—Irregular uterine bleeding is commonly, but not always, associated with feminizing tumours of the ovary and is due to the action of the œstrogens produced by the tumour. It is still debatable as to whether the origin of the œstrogens is the granulosa or theca cell or both and many arguments have been put forward in favour of one or the other view. In 1940, Traut and Marchetti reported a collected series of 61 tumours amongst which 15 showed no evidence of hormone activity. When associated with amenorrhœa they found characteristically a relatively undifferentiated type of tumour, a high theca cell content—a tumour type thought to be less productive in œstrogen—and a tumour showing fibrosis or other form of degeneration. In 4 cases of pure thecoma they found no evidence of endometrial reaction. These observations suggested that the theca cell was either totally or relatively inactive. On the other hand, and more recently, McKay, *et al.* (1949) stated that the œstrogenic effect was greater in thecomas and, in fact, concluded that the theca cell alone was the source of œstrogen. In the series of cases under review it was noted that endometrial changes indicative of œstrogen activity were associated with each group—granulosa cell, thecoma and combined tumours. For this reason the view is accepted that the granulosa and theca cells are each capable of producing œstrogens and thus no differentiation will be made whilst considering menstrual irregularities, which may be considered most conveniently in relation to the three age groups.

Pre-puberty: There is nothing to add to the well-established fact that œstrogenic tumours occurring at this period of life will cause precocious puberty with the development of secondary sex characteristics and with episodes of uterine bleeding. With removal of the tumour there will be cessation of bleeding and regression of the changes and in due course the phenomena associated with normal and spontaneous puberty will occur.

Child-bearing period: During this period the effects of the œstrogenic tumours upon menstrual function can be defined less clearly than in the pre-puberty and post-menopausal phases for, at this time, a complicating factor lies in the other ovary which, except in the uncommon instance of bilateral tumour, is probably normal. Periods of amenorrhœa of varying duration are a common, but not invariable, complaint. In some instances menstruation may be entirely regular or regular cycles may be followed by continuous bleeding or menstruation may be totally irregular. To account for the amenorrhœa the likely explanation is that the excessive œstrogen output of the tumour inhibits anterior pituitary function to such an extent that the opposite ovary becomes temporarily inactive.

Case B.1635.—Aged 33. Nullipara.
Symptoms: Abdominal swelling for three years; amenorrhœa for three months.
Following removal of a left combined tumour, amenorrhœa persisted and one year later the endometrium showed the typical picture of metropathia hæmorrhagica.

The unusual post-operative course in this case could be accounted for either by the recurrence of the tumour, by the development of a similar tumour in the other ovary or by a genuine metropathia affecting the remaining ovary. The subsequent follow-up of this patient will be of interest.

In view of the considerable hormonal disturbance associated with these tumours, it is not surprising that most of the patients are infertile. Very few instances of œstrogenic tumour associated with pregnancy have been reported but, once the tumour has been removed, and with the return of normal menstrual function, pregnancy again becomes a possibility.

Case C.2806.—Aged 39. Para-3.
Symptoms: Irregular periods of amenorrhœa for six years followed by irregular menstruation for one year and finally amenorrhœa for three months. Following removal of right granulosa cell tumour the menstrual cycle became regular and conception occurred eleven months after operation.

The endometrial pattern in cases of this age group may vary considerably but proliferative, metropathic or polypoidal changes are common.

Post-menopause: Comprising a majority of the cases, and in the presence of an atrophic and inactive endometrium, this age group supplies the best medium for considering the possible œstrogenic effects of the feminizing tumours. The factors which will influence endometrial response include the type and the qualitative and quantitative nature of the œstrogens and the sensitivity and reactivity of the endometrium. Thus the changes which might occur vary from a nil response to a proliferative picture, to a diffuse hyperplasia, to a metropathic "Swiss cheese" pattern and to diffuse or localized polypoidal formation. In the majority of cases, sooner or later, there will occur uterine bleeding which will recur if treatment is delayed. Such bleedings are probably due to a fluctuation in the blood level of œstrogen dependent upon proliferative or degenerative changes in the tumour, and thus assume the form of an œstrogen withdrawal hæmorrhage.

Case 5471.—Aged 53. Para-8. Menopause at 46 years.
Symptoms: Recurrent and irregular slight bleeding for three years.
Findings: Right granulosa cell tumour: Proliferative endometrium with cystic dilatation of glands.

Three possible explanations may account for the absence of post-menopausal bleeding which is a feature of a small percentage of cases: insufficient œstrogenic output, an unresponsive endometrium or the occurrence of some complication, such as torsion of the pedicle, necessitating operative treatment before the time for bleeding is ripe.

Case 15611.—Aged 68. Nullipara. Menopause at 47 years.
Symptoms: Anorexia, weight loss, acute abdominal pain. Palpable abdomino-pelvic tumour. Emergency operation.
Findings: Right thecoma, multiple fibroids. Left tubo-ovarian abscess. Polypoidal endometrium.

Of 19 cases where a report on the endometrium was available, benign changes were found in 14. The description of the endometrium was proliferative in 1, general hyperplasia in 5, a "Swiss cheese" pattern in 3, diffuse polypoidal hyperplasia in 4 and localized polypi in 1. The remaining 5 cases showed undeniable evidence of endometrial adenocarcinoma.

An almost constant finding in association with these tumours, irrespective of age group, is a moderate enlargement of the uterus, to not more than the size of an eight or nine weeks' gestation. This is due to myohyperplasia—a further example of the œstrogenic effects of the tumour.

(*b*) *Size of tumour.*—The size of the tumour may vary within very wide limits and some huge tumours have been recorded. When it attains sufficient size to become abdomino-pelvic or abdominal the patient will complain of abdominal swelling. Sometimes pain will be the result of pressure but at other times this symptom is due to a complication of the tumour or to the presence of co-existing disease. In the majority of cases the tumour is obvious upon abdominal or bimanual examination but occasionally nothing abnormal can be discovered either upon clinical examination or from the external macroscopic appearance of the ovary which may be quite normal in size. In such cases the small tumour is discovered only by sectioning the ovary. Obviously the size of the tumour will depend largely upon its proliferative activity and its age at the time of discovery.

Case 3636.—Aged 45. Nullipara.
Abdomino-pelvic tumour discovered accidentally. At operation the enlarged uterus containing multiple fibroids was removed together with the left appendages. The ovary was of normal size and looked healthy but on section was found to contain a small granulosa cell tumour. An endometrial polypus was present.

(*c*) *Complications.*—In common with other ovarian tumours the feminizing tumour is liable to be complicated by torsion of the pedicle, hæmorrhage or rupture. If the complication is of the acute variety then the clinical picture assumes the status of a gynæcological abdominal emergency which calls for immediate operative treatment.

Case 11822.—Aged 78. Para-5. Menopause at 50 years.
Admitted with the history of acute lower abdominal pain.
At laparotomy rupture of a right cystic thecoma was discovered.

(*d*) *Malignancy.*—It is not yet possible to give an accurate figure for the incidence of malignancy in the œstrogenic tumours but, in 1953, Novak reckoned that this figure would be in the region of 25–28%. The three methods by which the malignant nature of the tumour may be recognized are firstly the clinical features, secondly the histological appearances and thirdly the recurrence of the tumour or metastatic growth. The classical clinical features of any malignant ovarian tumour include pain, rapid growth, fixation and tenderness of the tumour, abdominal free fluid and, at laparotomy, signs of local infiltration and metastatic intra-abdominal spread. The second means of establishing a diagnosis of malignancy is by histological examination but this is often notoriously difficult unless there is obvious invasion of the tumour capsule or unless tumour cells can be demonstrated in the lymphatics.

Case 2687. Aged 34. Para-1.
Symptoms: Abdominal swelling and pain for three months. Regular menstruation.
Laparotomy revealed bilateral adherent tumours with gross ascites and multiple secondaries throughout omentum and peritoneum. The histological report was that of a malignant granulosa cell tumour with plugs of malignant cells in the adjacent lymphatics.

Further, certain proof of malignancy lies in the recurrence of the tumour or the development of metastases. In order to include all cases in this category a very long-term follow-up is essential for recurrence has been noted even after the lapse of fifteen to twenty years following treatment.

In our series 7 cases were, for one reason or another, diagnosed with certainty as malignant tumours and of these, 4 were granulosa cell, 1 thecoma and 2 combined tumours. This incidence of 16·3% is by no means final as the majority of the cases still require many years of follow-up observation.

(3) *Associated Pathological Conditions.*

Most communications on feminizing tumours of the ovary make some reference to the co-existence of endometriosis, uterine fibroids, carcinoma of the breast and carcinoma of the endometrium and many attempts have been made to attribute blame for these associated conditions to the œstrogenic effect of the ovarian neoplasm.

(*a*) *Endometriosis.*—Our records contain only 2 cases in which endometriosis was discovered. This condition is essentially related to the activity of the ovaries for the symptomatology is mainly due to the influence of the ovarian hormones upon the ectopic endometrium. Usually, symptoms of endometriosis terminate with the menopause but it is possible that if a functioning tumour continues to supply œstrogens beyond that time then certain endometriotic nodules may remain active and continue to cause symptoms. If we accept the theory that endometriosis is due to cell metaplasia initiated by œstrogenic stimulation during the active child-bearing period, it might be that the long-continued œstrogenic stimulation associated with an œstrogenic tumour will provide this necessary stimulus to metaplasia.

Case 8080.—Aged 25. Nullipara.
Symptoms: Normal menstruation prior to seven weeks' continuous bleeding.
Findings: Right ovarian cystic tumour containing both a granulosa cell tumour and endometriosis. The endometrium showed proliferative changes.

(*b*) *Uterine fibroids.*—Seven instances of uterine fibroids were reported in this series, a normal incidence, and of these 5 were associated with granulosa cell tumours and two with thecomas. 6 out of the 7 patients were beyond the menopause and in 2 of these, 1 granulosa cell and 1 thecoma, there was, in addition, carcinoma of the endometrium. Normally the growth of fibroids is confined to the active child-bearing period when, once again, the ovarian hormones are implicated and believed to provide the stimulus for growth from embryonic muscle-cell rests. Normally, some regression occurs with the menopause but it may be that, in the presence of a functioning ovarian tumour, the œstrogenic effect will prevent this change. There is no evidence to show that such œstrogenic tumours can initiate growth of a fibroid in the post-menopausal years and in none of the cases, discovered in this age group, did it appear that the fibroids were causing symptoms.

(*c*) *Carcinoma of the breast.*—Mention of this additional disease at once raises the difficult problem of the carcinogenic effect of the œstrogens and a brief reference to this subject will be made shortly. Several authors have recorded cases of mammary carcinoma in patients with œstrogenic tumours, for example, Macafee in a paper to the Edinburgh Obstetrical Society in 1954 mentioned 2 cases amongst a series of 23 thecomas. Dockerty and Mussey (1951) found 3 cases of mammary carcinoma in a group of 87 feminizing tumours. From our records we could find only 1 case and this again was associated with a thecoma, and also with adenocarcinoma of the uterine body.

(*d*) *Carcinoma of the endometrium.*—The association of carcinoma of the endometrium and œstrogenic tumours of the ovary constitutes one of the most debatable subjects of the

present day. In 1950 Haines and Jackson reviewed a series of 40 cases without a single associated carcinoma of the body but, on the other hand, in 1951, Dockerty and Mussey reported 15 cases of uterine carcinoma amongst 87 patients with œstrogenic tumours and, in the same year, Ingram and Novak (1951) in a review of the literature from 1920 to 1949 found 50 cases of the co-existing tumours, and they added 4 more. Of the total, 29 were thecomas and 25 granulosa cell. In 1954, Macafee reported 4 instances of carcinoma of the body in 23 cases of thecoma and 2 further body carcinomas were found in 17 cases of granulosa cell tumours. In our series there were 5 patients with adenocarcinoma of the endometrium, 3 associated with granulosa cell tumours and 2 with thecomas. Dockerty and Mussey considered that the incidence of the combined conditions was greater than could result from chance but Emge, in 1953, held the opposite viewpoint. He stressed the difficulty in differentiating between atypical hyperplasia and early carcinoma and quoted a series, consisting of 29 granulosa cell tumours and 14 thecomas, without associated endometrial carcinoma. The main difference of opinion in this matter concerns the carcinogenic effect of the œstrogens. Emge considers that his findings do not prove œstrogens to be carcinogenic but Dockerty and Mussey believe otherwise and quote as evidence the experimentally induced cancer in mice, the rarity of carcinoma after oophorectomy, the œstrogenic vaginal smears obtained in cases of malignant uterine lesions, and the late menopause common in patients with fundal carcinoma. Novak, amongst many others, upholds this view and claims that the carcinogenic effect of thecomas is greater than granulosa cell tumours and Ingram and Novak (1951) consider that the older age group is particularly liable to this combination of tumours.

To sum up the present position it would seem that, whilst most published series record a high incidence of the combination of these tumours, the carcinogenic effect of œstrogens in the human requires clarification. It remains a theoretical possibility that if a potentially malignant cell exists in the endometrium then the stimulus for growth may be provided by the œstrogens which are capable of causing marked proliferation in the normal tissues of their target organs. If this stimulus is lacking then the malignant cell may never proliferate or the individual may die from some other cause before tumour formation becomes established.

Œstrogenic tumours and pelvic irradiation: Following several reports of cases of œstrogenic tumour growing and causing symptoms after pelvic irradiation, it has been suggested that such irradiation might have a stimulating effect upon the granulosa and theca cells. Commenting on experimental work in mice in which ovarian tumours had been induced by X-ray radiation, Traut and Butterworth (1937) considered the effects of irradiation to be degeneration of ova, partial degeneration of granulosa cells, slight effect on theca cells and, finally, proliferation of germinal epithelium and granulosa cells. In 1940 Traut and Marchetti, reporting 2 cases following intra-uterine irradiation, considered that this treatment did not prevent or destroy the ovarian tumour. In 1951 Ingram and Novak mentioned 5 cases of feminizing tumour following previous pelvic radiation.

Case B.8809.—Aged 61. Para-2. Menopause induced by sterilizing dose of X-rays, for metropathia, at 53 years. There followed six months' amenorrhœa, then six years' irregular bleeding and recently three months' continuous bleeding.

Findings: Thecoma with hyperplastic polypoidal endometrium.

Case D.5272.—Aged 58. Para-5. Spontaneous menopause at 44 years. Thereafter irregular bleeding until 55 years. Curettage led to diagnosis of metropathia treated by sterilizing dose of X-rays. Further bleeding three years later.

Findings: Granulosa cell tumour with polypoidal endometrium.

In these 2 cases quoted from our series it seems likely that the tumour was in existence at the time of X-ray irradiation and continued to grow thereafter.

Diagnosis

In the past the usual means of diagnosing an œstrogenic tumour was by histological examination of an ovarian neoplasm removed at operation. With a greater knowledge of clinical features, however, and an awareness on the part of the gynæcologist of the existence of such a tumour it is probable that a more frequent clinical diagnosis, or at any rate presumptive diagnosis, will be made before treatment is undertaken. In the patient who is still menstruating, the chances of such a diagnosis must still remain remote, at least in the early stages of the tumour growth. At this time the clinical features may well fit in with the diagnosis of the more common condition of metropathia hæmorrhagica. The endometrium shows evidence of prolonged œstrogenic stimulation, the uterus is enlarged, and ovarian enlargement is also present due to the follicular cyst. In addition there is the common history of periods of amenorrhœa. Perhaps the clue to the presence of an œstrogenic tumour in this age group would be the continuation of œstrogenic effects, in spite of treatment, and ultimately the recognition of progressive enlargement of the ovary.

In the post-menopausal patient it is likely that the presenting symptom will be bleeding, although, as previously mentioned, there are exceptions to this rule. The causes of post-menopausal hæmorrhage are many and the incidence of œstrogenic tumours as a cause of this bleeding is low. In 1933, Fahmy analysed a large series of 937 cases of post-menopausal hæmorrhage and found the cause to be granulosa cell tumour in only 3 patients. Because of the high incidence of malignant lesions of the genital tract as a cause of this abnormal bleeding, any patient with this complaint must be fully investigated without delay. This rule holds good even if there is a clear history of œstrogen therapy, nowadays employed with increasing frequency in the treatment of post-menopausal symptoms, senile vaginitis and many other conditions. As is well known, such therapy may or may not be associated with withdrawal bleeding dependent upon dosage, period of treatment and endometrial sensitivity. In all cases where the diagnosis is not immediately obvious, such as in clinically established carcinoma of the cervix, diagnostic curettage is an invariable necessity. This investigation may produce evidence of endometrial activity in either a benign or malignant form. In the former case, with the exception of women within a year or two of the menopause and those who have received œstrogen therapy, the presence of endometrial activity indicates abnormal functioning œstrogenic tissue somewhere in the body and if, on examination, an ovarian tumour, irrespective of size, is discovered then the likely diagnosis is that of œstrogenic tumour of the ovary. In the absence of a palpable tumour, but in the presence of positive endometrial findings, laparotomy is justifiable. In doing this a suspected tumour may be discovered before its presence becomes clinically obvious. The following 2 case records are quoted to illustrate these points.

Case C.124.—Aged 64. Para-3. Menopause at 53 years.
Symptoms: At age of 60 years, irregular bleeding for one year.
Endometrium—"Swiss cheese" pattern with small polypi.
At the age of 62 years there was further bleeding. At this time the endometrium showed the typical pattern of metropathia.
With recurrence of bleeding at the age of 64 years, laparotomy was performed and a left granulosa cell tumour was removed. The endometrium still showed metropathic changes.

Case A.6740. Aged 68. Para-2. Menopause at 53 years.
Symptoms: At age of 65 years, four days' bleeding.
Endometrium—active, with polypus. At age of 66 years, six weeks' bleeding.
Endometrium—hyperplasia, with polypus. At age of 67 years, four days' bleeding.
Endometrium—cystic hyperplasia. At age of 68 years, five days' bleeding. At laparotomy a small right combined tumour was removed.
Endometrium—metropathic changes.

When diagnostic curettage for post-menopausal bleeding reveals the presence of carcinoma of the endometrium, the possibility of a co-existing œstrogenic tumour should be kept in mind particularly if the history of bleeding has extended over many years.

Case 6120. Aged 62. Para-3. Menopause at 50 years.
Symptoms: Irregular bleeding since the menopause (twelve years).
Diagnostic curettage—adenocarcinoma of body.
Treatment was by total hysterectomy with removal of appendages. The ovaries were normal in size but on section one contained a small granulosa cell tumour which, on histological appearances, was regarded as malignant.

In this case it seems probable that the ovarian tumour was responsible for the many years of bleeding and that the endometrial carcinoma was an additional, but more recent, factor in causing the hæmorrhage.

For the future, we should explore in two directions in order to elucidate some of the many problems still associated with these interesting œstrogenic tumours of the ovary. Firstly, much can still be learned from the study and analysis of really large groups of cases and we look towards such organizations as the Ovarian Tumour Registry of the American Gynæcological Society to provide a sufficient number of collected cases to merit authoritative conclusions. The second approach which is likely to yield results lies in the reliable assay of œstrogenic and pituitary hormones. A few assays of œstrogens have been made in cases of œstrogenic tumour by biological methods but these are quantitatively inaccurate and the same criticism may be levelled against the findings in vaginal smears. Quite recently Brown (1955), working in the Clinical Endocrinological Research Unit in Edinburgh, has evolved a method of urinary extraction and colorometric estimation of œstradiol, œstrone and œstriol. This method appears to be very accurate but, as yet, has been applied to only one case of thecoma. A single twenty-four hours' urinary assay produced quantities of the œstrogens not considered to be excessive for the patient's age, 86 years. However we look forward to the further clinical application of this assay method to future cases of suspected œstrogenic tumour of the ovary.

I should like to record my thanks to the many gynæcologists who so willingly supplied details of their personal cases.

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Mr. G. W. Blomfield (Lecturer in Radiotherapy, University of Sheffield; Medical Director, Sheffield National Centre for Radiotherapy; Consultant Radiotherapist, United Sheffield Hospitals):

Tumours of the ovary present peculiar difficulties in their classification. Ewing states, "Ovarian tumours present a wider scope of structure, greater individual variation and a more complex embryologic and histogenic basis than those of any other organ, and for these reasons they have escaped satisfactory classification". I have interpreted functioning ovarian tumours as those which are likely to have a hormonal effect upon the patient by reason of endocrine function. Usually ovarian tumours are asymptomatic during the initial stages, and except in the case of functioning tumours, the first sign or symptom is usually a painless swelling of the abdomen—though pressure symptoms, torsion and rupture can give rise to acute symptoms.

In order to get a comparison between tumours of a special and unusual type and the more common varieties, all cases of malignant ovarian tumour referred to the Radiotherapy Centre at Sheffield during the decade 1943–1952 have been reviewed. There were 216 cases and some interesting facts emerge. The tumours were of a very great diversity in type, and they varied from the anaplastic and metastasizing growths to the relatively benign and slow growing. Some were difficult to assign, and a definite pronouncement regarding their malignancy was not possible even when the whole tumour was available for pathology.

Of the 216 cases reviewed (*see* Table I) about one-half were dead within one year of being

TABLE I.—MALIGNANT OVARIAN TUMOURS REFERRED FOR RADIOTHERAPY. SHEFFIELD. 1943–1952

Total No. of cases	..	216
Alive and well ..	..	45
Alive with recurrence	..	5
Died within 1 year ..	..	102
Died after 1 year ..	..	64
Total deaths ..	166	

TABLE II.—MALIGNANT OVARIAN TUMOURS. TEN-YEAR SURVIVALS

Year	Case No.	Age	Pathology	Treatment	Survival years	Remarks
1943	543	41	Adenocarcinoma	S+DX 3000 Ra $\frac{1700}{2550}$	11	Only survival of 12 cases. 6 died under 1 year. 1 died ca. breast 6 years
1944	21	11	Dysgerminoma	Lap. Biopsy DX 1500 to primary and para-aortic glands.	10	Well. No menstruation
1944	48	48	Primary growth undetermined	Lap. Biopsy DX 3000	10	1954 mass in neck adenocarcinoma
1944	1031	42	Adenocarcinoma	S+DX 3000 Ra 0/1550	10	Original diagnosis secondary
1944	1373	65	Granulosa cell tumour	S only	10	

S=Surgery.
DX=Deep X-ray therapy. The tumour dose follows in roentgens.
SX=Supervoltage X-ray therapy.
Ra= Intracavitary radium. The uterine/vaginal dose follows in mg. hours.

referred for treatment. Of those surviving one year, about 2 out of 5 remained clinically clear or controlled.

The overall five-year survival rate was just over 18% but this should be viewed in its proper perspective. The series includes all manner of advanced and inoperable cases many of which were recurrent or persistent growths following surgery.

Table II shows the ten-year survivals analysed for pathology and treatment. They include one case of dysgerminoma treated by X-ray therapy alone and one case which was originally of undertermined pathology which has recently shown evidence of metastatic deposits in the neck of an adenocarcinomatous origin.

Table III gives the five- to ten-year survivals. An example of difficult diagnosis is exhibited

TABLE III.—SHEFFIELD RADIOTHERAPY CENTRE MALIGNANT OVARIAN TUMOURS FIVE- TO TEN-YEAR SURVIVALS

Year	Case No.	Age	Pathology	Treatment	Survival years	Remarks
1945		48	Carcinoma	S+DX 2500	9+	Only survival of 17 12 died under 1 year
1946	993	43	Pap. cystadeno. ca	S	8	Too obese for radiotherapy
	1156	49	Bilat. adenoca.	S+DX 2600	8	Resembled ut. ca. Uterus clear
	1486	39	Pap. cystadenoca.	S+DX 2700	8	
	151	55	R. adenoca. 1939 Mal. teratoma 1945	S+DX 300 (1945) Ra 2000	8	2nd growth incinerated by energetic nurse
	382	40	Mal. teratoma	S+DX 2500	8	
	519	46	Pap. adenoca.	S+DX 1800	8	15 other cases not surviving 1946
	783	40	Pap. cystadenoca.	S+DX 1500 Ra 1500/2000	8	
1947	1024	23	Medullary ca.	• S only	7	Only survival of 22 and probably a thecoma
1948	1190	50	Pap. cystadenoca.	S+DX 2700	6	
	1237	44	Cystadenoca.	S	6	
	1369	70	Pseudomucinous cystadenoca.	S	6	"Low malignancy"
	1661	47	Pseudomucinous cystadenoca.	S+DX 2550	6	23 others not surviving 1948

S= Surgery.
DX=Deep X-ray therapy. The tumour dose follows in roentgens.
SX=Supervoltage X-ray therapy.
Ra=Intracavitary radium. The uterine/vaginal dose follows in mg. hours.

in Case No. 151 (1946) where the tumour was incinerated by an energetic nurse before it could be examined histologically. The only survival of 1947 was also a problem in diagnosis. Reassessment of this case shows that the tumour was most probably a thecoma, though diagnosed originally as a medullary carcinoma. Table IV shows the five-year

TABLE IV.—SHEFFIELD RADIOTHERAPY CENTRE MALIGNANT OVARIAN TUMOURS FIVE-YEAR SURVIVALS FROM 1949

Case No.	Age	Pathology	Treatment	Survival years	Remarks
36	47	Pseudomuc. cystadenoca.	S	6	
165	68	Pap. cystadenocarcinoma	S	6	
258	37	Pap. cystadenocarcinoma	S+DX 3000	6	
264	46	Pap. cystadenocarcinoma	Lap. Biopsy DX 2500 Excision later	6	Reverted to benign condition after radiotherapy
381	33	Pap. cystadenoca. Bilat.	S+DX 3150	5	
390	52	Pseudomuc. cystadenoca. Parietal extensions	S+DX 3450	5	
465	47	Granulosa cell ca. Also Meckel's diverticulum	S (incomplete) DX 2100 SX 4000 later	5	Controlled
1019	51	Carcinoma. Bilateral.	S	5	Too obese for radiotherapy
1434	49	Pseudomuc. cystadenoca.	S+DX 2800	5	Low malignancy

S=Surgery.
DX=Deep X-ray therapy. The tumour dose follows in roentgens.
SX=Supervoltage X-ray therapy.
Ra=Intracavitary radium. The uterine/vaginal dose follows in mg. hours.

survivals (from 1949) and it will be seen that we were still giving relatively low doses in routine post-operative radiotherapy—generally of the order of 3,000 r units tumour dose in four weeks. It has not been our policy to radiate the whole abdomen and the therapy has generally been limited to the pelvis, the iliac glands and the lower para-aortic group, the area covered depending upon the individual case. Case No. 264 is of some interest in that the growth was inoperable, a biopsy only being possible. It was treated first by deep X-ray therapy. It regressed considerably and became operable later. After removal it was carefully examined and all traces of the original carcinoma had disappeared, leaving a simple cystadenoma behind.

Not many functioning tumours were found in the survey of 216 cases and in order to obtain further material for analysis it was necessary to go further afield. I am indebted to many of my colleagues for clinical details of cases sent from Edinburgh, Birmingham, Oxford, Cambridge, Glasgow, and the Royal Marsden Hospital and the Royal Free Hospital at London.

The cases have been analysed into the following groups:

(1) Feminizing tumours: granulosa cell tumour; thecoma (non-malignant).

(2) Masculinizing tumours: dysgerminoma; arrhenoblastoma.

(3) Other functioning tumours.

Feminizing Growths of the Ovary

Granulosa cell tumour.—Though it is difficult to say which particular growths have a high degree of malignancy, the evidence available shows that the granulosa cell group as a whole is malignant. These growths are, however, very much less malignant than the average run of ovarian tumours, and out of the 99 cases in the series 66 were living and clinically free from disease after three to thirteen years follow up, and 26 had died of disease (*see* Table V). Extensive and fixed tumours were, as a rule, fatal, but some of these and

Table V.—Granulosa Cell Tumour. All Cases. Follow Up Three to Thirteen Years

Total No. reviewed	..	99
Alive and well ..	..	66
Alive with recurrence	..	4
Died other causes	..	3
Died of disease ..	..	26

some recurrent growths treated by radiotherapy were successfully controlled. There can be no doubt that radiotherapy can control these growths and several cases in my own series responded to radiotherapy after surgery had failed.

Example: Mrs. L. W., aged 47.

Partial removal of left ovarian tumour 16.3.49.

Pathologically this was a granulosa cell tumour of mixed cell type. Mitoses were rather more frequent than is usual in a granulosa cell tumour. A peritoneal nodule showed "actively growing granulosa cell tumour". This patient had a course of deep X-ray therapy to 2,100 r depth dose in 1949. A course of supervoltage X-ray therapy was given to a depth dose of 4,000 r in four weeks for a pelvic recurrence in March 1951. She was living in December 1954 but had then developed further secondary deposits, this time in the liver.

Example from another centre: Patient aged 51 with irregular vaginal hæmorrhages and a large swelling arising out of the pelvis to midway between the symphysis pubis and the umbilicus. Operation 31.8.49. A large granulosa cell tumour of the ovary was removed but hard necrotic nodules on the pelvic wall, peritoneum and ascending colon were left behind. Histologically it was a granulosa cell tumour of folliculoid pattern. Post-operative deep X-ray therapy was given by large opposed fields 30 cm. × 30 cm. at 100 cm. F.S.D. to 2,500 r units incident dose. She remained well for five years after which widespread secondary deposits appeared in the skin of the trunk.

There are three more cases reported from other centres where X-ray therapy was given to recurrences and where this was followed by resolution or control of the deposits for periods of several years, one patient being free from symptoms six years after treatment to extensive recurrence in the inguinal region. As these metastases sometimes arise from relatively slow-growing tumours their control can give relief from symptoms for long periods, and X-ray therapy can be of lasting benefit.

The treatment policy at most hospitals is one of surgery in the first instance. Post-operative X-ray therapy is seldom carried out as a routine treatment and the number of such cases available for analysis is insufficient to warrant conclusions as to its desirability. There is no doubt, however, that granulosa cell tumours of the ovary are relatively sensitive to irradiation and it would seem well justified to give a course of radiotherapy as a post-

operative measure where there is suspected spread beyond the area of surgical excision or where the removal is incomplete.

Thecoma.—I mention thecoma merely because it is a functioning tumour and is commonly associated with changes in the edometrium which may go on to the frank carcinoma of the uterus. It is also found in association with granulosa cell tumours. Out of 31 cases of thecoma collected there were 2 deaths, both following upon operation, and no cases where the tumour showed clinical evidence of malignancy apart from its association with other ovarian and uterine tumours.

It would appear that surgical treatment is the surest way of dealing with it and in any event it could hardly be diagnosed with any reasonable degree of certainty without operative measures.

Virilizing Growths of the Ovary

Dysgerminoma.—The dysgerminoma is not, perhaps, a true functioning tumour, its effect being generally negative rather than positive. It does not result in obvious virilizing effects but it may result in lack of female development. It occurs in young girls, sometimes before puberty and generally in otherwise perfectly healthy individuals.

In all I have been able to collect 24 cases and 6 of them were Sheffield cases on which I have very full clinical details. The malignancy (under present methods of treatment) would appear to be lower than ovarian tumours in general but higher than in the granulosa cell tumour in particular (*see* Table VI).

Table VI.—Dysgerminoma

Hospital	Total	Alive	Survival years	Untraced	Died disease	Survival years
Women's Hospital, Birmingham	5	3	13+ 12+ 4+	1	1	2+
Churchill Hospital, Oxford	2	1	4+	—	1	2+
Royal Infirmary, Edinburgh	5	1	13+	—	4	3+ (3/12) (3/12) (1/12)
Royal Marsden Hospital, London	1	0	—	—	1	(1/12)
Weston Infirmary, Glasgow	5	3	4+ (6/12)+ (4/12)+	—	2	1+ (7/12)
Sheffield National Centre for Radiotherapy	6	3	10+ 8+ 3+	—	3	3+ 1+ (8/12)
Total	24	11		1	12	

Cases treated by radiotherapy at Sheffield have generally been either completely inoperable or recurrent following surgery. Three are worth particular mention:

I.—Miss I. B., aged 11 when first seen in 1944. She had pain in the right iliac fossa for twelve months, getting worse, and would wake up screaming. She had already had appendicectomy two years previously. She had a marked frequency of micturition being unable to hold urine more than one hour. On examination there was a fixed mass arising out of the right side of the pelvis and reaching to the umbilicus. Laparotomy was carried out but only a biopsy could be obtained and findings confirmed the previous diagnosis of fixed growth. The biopsy was reported as "Seminoma"—had it been mixed with another specimen from a male? There was no possibility of this, however, and the tumour was a dysgerminoma.

She was given deep X-ray therapy, 1,500 r in nineteen days to the tumour and 1,500 r in twenty-eight days to the para-aortic gland.

No other treatment was given in this case and the tumour steadily resolved so that two months later there was very little to feel and four months later there was no sign of it. She has remained well and ten years later is perfectly healthy apart from the fact that she has never menstruated.

II.—In another case which was "operable" the tumour proved to be fatal.

Miss J. J., aged 11 years, noticed a lump herself when she had severe abdominal pain in May 1948. She was operated upon in June 1948 having supra-vaginal hysterectomy and double-salpingo-oophorectomy. Histological examination confirmed this as a typical dysgerminoma and post-operative deep X-ray therapy was given to the pelvis to a depth dose of 2,100 r in fourteen days. She was well after this until January 1950 when abdominal recurrences appeared and she died from abdominal extensions in April 1950, about two years after removal of the primary growth.

III.—In another case secondary deposits proved fatal. Miss J. H., aged 13. Operation in April 1948 for a pelvic mass which proved histologically to be a dysgerminoma. She was not referred for

radiotherapy until June 1949 when she had a mass in the mediastinum and in the left supraclavicular fossa. These were secondary deposits and she had several courses of X-ray therapy to these areas and to the spine, to approximately 2,000 r but the growths were widespread and proved fatal. She died three years after removal of the primary growth. Radiotherapy kept the tumours under control for two years.

Another case reported to me by Dr. A. A. Charteris of Glasgow is of some interest.

Child aged 12 years with a swelling up to the umbilicus. She had the tumour removed 5.7.50 and there was infiltration of the omentum. The tumour was a dysgerminoma and the infiltration was microscopically confirmed as an extension. She had 2,500 r units tumour dose by deep X-ray therapy in four and a half weeks, post-operatively, and she was well and free from recurrence four years later. There was no menstruation before or after treatment, but otherwise development was normal.

The conclusion I draw from these cases and from other cases reported to me by my colleagues is that dysgerminoma of the ovary behaves very like seminoma of the testis in its response to irradiation. As it is liable to recur post-operatively there would appear to be a good case for routine post-operative radiotherapy unless the growth is completely removed and the opposite ovary unaffected. Spread to the opposite ovary is however not uncommon.

Arrhenoblastoma.—The rarity of this growth makes it difficult to draw definite conclusions regarding its treatment by radiotherapy. 7 cases are reviewed—4 from Sheffield and 3 reported from other centres (*see* Table VII). These cases showed great individual variations.

TABLE VII.—ARRHENOBLASTOMAS

Hospital	Cases	Alive	Survival years	Untraced	Died disease	Survival years
Sheffield National Centre for Radiotherapy	4	2	4+ 4+	—	2	1+ (4/12)
Addenbrooke's Hospital, Cambridge	2	0	—	—	2	(1/12) (6/12)
General Infirmary, Leeds	1	1	3+	—	—	—
Total	7	3			4	

One of the Sheffield cases had extensions up the right ileo-cæcal gutter from a large mass in the right iliac fossa. It was inoperable and too extensive even for radiotherapy though irradiation was attempted and abandoned. It was rapidly fatal.

Another case occurred in a mental defective who had a somewhat masculine distribution of hair. The growth here was large and extended into the left broad ligament beyond the range of surgery. After partial removal she had deep X-ray therapy to 3,000 r depth dose in twenty-one days and she died four months later with growth still present.

The 2 other cases at Sheffield were earlier cases and were dealt with successfully by excision of the growth.

OTHER VIRILIZING AND FEMINIZING TUMOURS

There are other tumours, some of which have more powerful hormonal effects, particularly those of adrenal origin but I have no experience of their treatment by radiotherapy.

Chorionepithelioma can occur as a primary tumour of the ovary as it can in the testis; as such it is an even greater rarity. From my personal experience of the latter—it would have some degree of radiosensitivity but is not to be classed amongst the very sensitive growths and by the time it is recognized it is not likely to be curable.

Besides these tumours there are other malignant growths which can function, such as struma ovarii and struma ovarii malignum. From my experience of malignant thyroid adenomas the latter could very well be of secondary origin. It is excessively rare.

Simple teratomas or "dermoids" may rarely go on to malignancy—particularly in their epithelial elements. Table VIII is an analysis of the few cases I have been able to collect.

TABLE VIII.—MALIGNANT DERMOID

Hospital	Cases	Alive and well	Died	Survival years
Sheffield National Centre for Radiotherapy	2	2	0	15 8
Churchill Hospital, Oxford ..	1		1	(1/12)
Women's Hospital, Birmingham	1		1	(1/12)
Total	4	2	2	

One case at Sheffield presented a simple dermoid cyst on the right side and a solid malignant dermoid on the left side, with undifferentiated ectodermal tissue invading the local stroma. As it was completely excised there was no special indication for radiotherapy.

In the course of this investigation into special tumours of the ovary some interesting cases were found, some of which were of unknown pathology. In one instance a large ovarian tumour in a woman of 56 proved to be inoperable but a "deposit" in the omentum was taken for histology. This "deposit" was inadequate for pathology. Supervoltage X-ray therapy was given to a depth of 2,700 r units in three weeks. Seven months later the growth had regressed so much that operation was again attempted and this time the tumour removed. But only the stroma remained and the malignant growth had presumably been completely absorbed after radiotherapy.

Another case which was referred for radiotherapy is of pathological interest. The growth consisted of an adenocarcinoma arising in an endometrium of the ovary, one ovary containing benign endometrial cysts, the other and larger ovary showing a change from endometriosis to frankly malignant adenocarcinoma. It was, therefore, a case of malignant change in functioning ectopic endometrial tissue.

Treatment Techniques

The technique which offers the best prospects of palliation or cure should be varied to suit the pathology and anatomical distribution of the growth. Both these factors will have to be borne in mind. We can divide the cases into the following types: (1) Treatment of a primary inoperable growth with no known metastases. (2) Treatment of a primary growth with known metastases. (3) Post-operative radiotherapy—suspected spread beyond the field of operation. (4) Treatment of recurrences.

(1) *Treatment of the inoperable primary growth.*—Though there may be no known secondaries a tumour such as a dysgerminoma is likely to produce para-aortic glands. Here we should treat the primary growth and the glands which are most likely to be affected. But we should spare the upper abdomen and avoid taking more than one-third to one-half of the kidneys into the field of radiation. The same technique would be logical for other functioning tumours, but higher doses should be given for the less sensitive types.

(2) *Treatment of primary growth with known metastases.*—When known metastases are within the abdomen, abdominal baths are worthy of trial, but they seldom control any but the most sensitive growths, the dose being limited by the renal and hepatic tolerance. The main object will be palliative therapy in the majority of cases.

(3) *Post-operative radiotherapy for suspected spread beyond the field of operation.*—The treatment here will no doubt depend upon the nature of the growth and the probable extent of the spread. In a case of relatively low malignancy but moderate radiosensitivity, it would appear better to give a relatively high dose to the pelvis and leave the upper abdomen out of the radiation field. To take the whole abdomen into the field of radiation would seem to me unjustified and likely to lead to such low dosages as to be insufficient to deal with the most likely contaminated area—the lower abdomen and pelvis.

(4) *Treatment of recurrences.*—There is good evidence that recurrences from certain types of ovarian tumours, particularly from dysgerminomas and granulosa cell tumours, will respond to radiation. Combined surgery with post-operative radiation for accessible recurrences would appear to be well justified. For the inoperable recurrences radiotherapy is generally worth while. It may give relief to the patient and control the disease.

In conclusion it can be said that functioning tumours of the ovary form a relatively uncommon but important group. Amongst these tumours varying degrees of malignancy are met with but even taking the malignant functioning growths as a whole, they have a much more favourable prognosis than the ordinary carcinomas of the ovary which are commonly met with. They yield better to radical surgery, and certain types, such as the dysgerminoma, are particularly responsive to radiotherapy.

Supervoltage X-ray therapy has advantages over X-ray therapy at lower energies for these tumours, as it has for other deep-seated tumours, and would appear to be all the more desirable on account of the very good chance of controlling these growths.

My thanks are due to Dr. C. G. Paine for his kind help and advice on the pathology, to Dr. F. E. Neal, who assisted me in the analysis of cases, to Dr. C. W. Taylor, for details of his own cases and to Dr. Frank Ellis and many of my colleagues who so kindly assisted me by supplying material from other centres.

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[*February* 18, 1955]

Bilateral, Symmetrical, Peri-ureteric Fibrosis

By F. P. Raper, F.R.C.S.

A purely descriptive title has been chosen because the exact nature of the disease to be described remains obscure. No cause has been found for the condition and it therefore differs from the peri-ureteric fibrosis which may follow irradiation or which may involve one ureter in some patients with regional ileitis or diverticulitis. The disease seems to originate as an inflammatory process in the region of the main vessels of the posterior abdominal wall. A very invasive fibrosis occurs which may surround and penetrate the ureters as a result of which they are pulled towards the mid-line, compressed and finally occluded. The early stage of the disease is vague and insidious but it proceeds to its climax rapidly as uræmia or anuria develops. The early symptoms are so variable as to defy compilation and therefore the individual case histories have to be reported.

Case I.—Miss E. C., aged 25.

In December 1952 she was admitted to hospital with the complaint that for two weeks she had had abdominal colic, vomiting and vaginal bleeding. For two days before admission she had severe headache and œdema of her legs and face. She looked pale and ill and was found to have a tender enlarged left kidney and slight tenderness in the right loin. Examination of the vagina showed no bleeding and there were no signs of pregnancy. A small, very offensive cotton-wool swab was removed from the vagina. The urine was sterile but contained a few red cells and scanty clumps of pus. The blood urea was 240 mg.%.

She was cystoscoped and catheters were passed into both ureters but the left ureter was found to be obstructed at about 10 cm. while the right catheter, after a little difficulty, reached the kidney. The ascending pyelograms showed a right hydronephrosis with a tortuous upper ureter but no dye reached the left kidney (Fig. 1).

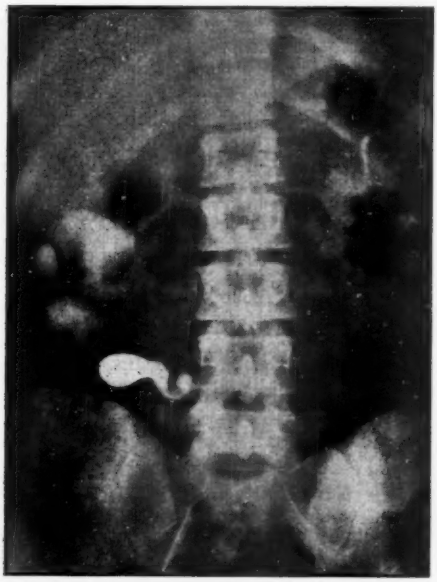

Fig. 1.—Ascending pyelogram, Case I, showing right hydronephrosis and tortuous upper ureter. No dye could be injected into the left kidney. Both ureters are closer to the mid-line than normal where they cross the promontory of the sacrum.

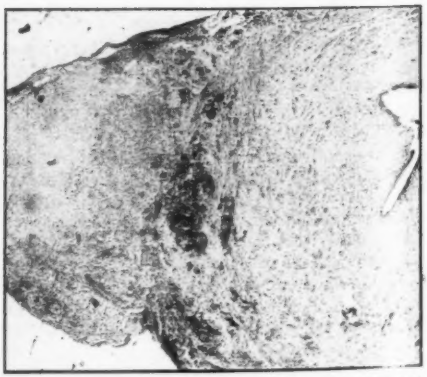

Fig. 2.—Transverse section of part of the left ureter removed from Case I. The lumen of the ureter is on the right of the picture and the wall of the ureter has been invaded by fibrous tissue which penetrates between the muscle fibres. ×10

After preliminary control of her electrolyte balance as a result of which the blood urea had fallen to 146 mg. %, the right kidney was explored. The hydronephrosis was found to be due to obstruction of the ureter by a short length of fibrous tissue just above the point where it crossed the common iliac artery. The ureter was dissected from the scar tissue without much difficulty and appeared undamaged. A piece of the fibrous tissue was removed for histological examination. One month later the left ureter was explored and an identical type of obstruction found. On this occasion it was impossible to dissect the ureter from the scar tissue and about 3 cm. had to be excised, continuity being restored by end-to-end anastomosis. The peritoneum was opened but no intra-abdominal abnormality could be felt. The histology of the excised piece of ureter and of the fibrous tissue removed at the first operation showed marked fibrosis, lymphocytic and plasma cell infiltration and some areas of calcification in the scar tissue. The epithelial layer of the ureter was normal even where the lumen was almost obliterated by surrounding fibrosis (Fig. 2).

Case II.—Mr. J. C. T., aged 45.

In 1951 he was admitted to hospital with pain in the chest and loss of energy. He had also had pain in his limbs for six months. A marked pericardial friction rub was found but an X-ray of his chest was normal. His B.S.R. was 57 mm. in the first hour (Westergren). He was given salicylates and his condition improved so that after four months he returned to work. He continued to get occasional pains in his abdomen and loins and in February 1954 had persistent epigastric pain and a barium meal showed a duodenal ulcer. He was treated for this with Aludrox and a diet but, as his symptoms did not abate, he was admitted to hospital for further investigations. A month before admission he developed the additional symptoms of vomiting, coldness of his hands and feet and pain in his calves when he walked. He looked pale and ill but no abnormality was found on clinical examination. All the pulses were present in his legs. Another barium meal showed that the duodenal ulcer was still present. His white cell count was 16,000, the erythrocyte sedimentation rate 140 and his blood urea was 56 mg. %.

He was treated by an intragastric milk drip but within twenty-four hours got severe pain in his left loin and his left kidney was found to be enlarged and tender. Two days later his blood urea had risen to 172 mg. % and frequent pus cells were found in a sterile mid-stream specimen of urine. An ascending pyelogram was attempted but both catheters were held up at about 10 cm. (Fig. 3). As the

FIG. 3.—Ascending pyelogram, Case II. Both ureters are blocked at the level of the fifth lumbar vertebra and are closer to the mid-line than normal.

site of the ureteric obstructions seemed close together, a laparotomy was done and the ureters were found to be involved in an inflammatory process centred on the tissues in front of the vertebral bodies. In addition, the upper part of the jejunum was fixed to the posterior wall as if its mesentery had become contracted rather than by intraperitoneal adhesions. The left ureter was dissected free from scar tissue which involved about 2 cm. of it near its centre and which bound it firmly to the side of the aorta. The right ureter was completely obliterated by the fibrous tissue where it crossed the bifurcation of the iliac vessels and it was therefore divided above and below the obstruction and re-

united over a T-tube. About 4 cm. of ureter were involved by the fibrosis. Histological examination of the fibrous tissue including the obstructed ureter showed very similar changes to those in Case I.

At first he passed urine from the bladder satisfactorily but no urine ever drained from the T-tube. His blood urea fell but then began to rise again and the urine output diminished. A left nephrostomy was therefore done and the previously constricted area of ureter re-examined and fixed further from the mid-line. Several muscle biopsies were done but there was no evidence of polyarteritis. One month later, urine reached the bladder when the nephrostomy tube was clamped and this tube and the T-tube were then removed. Both wounds closed spontaneously.

He now looks and feels very much better and no longer has pain in his legs. His urine is normal, his blood urea is 45 mg.% but an intravenous pyelogram still shows no function in the right kidney; there is a short area of constriction in the centre of the left ureter and slight left hydronephrosis.

Case III.—Mrs. B. J., aged 41.

In June 1950 she had a right radical mastectomy for carcinoma of the breast, the tumour being in the upper and outer quadrant, but all the lymph glands examined were free from metastases. This was followed by a course of deep X-ray therapy. She remained well until May 1954 when she developed menorrhagia. In June 1954 she also noticed a lower abdominal swelling and had attacks of painful lower abdominal distension and constipation. She was referred to a gynæcologist in November 1954 who found a large uterine fibroid which appeared to be the explanation of her symptoms.

On 17.11.54, she had a total hysterectomy and bilateral salpingo-oophorectomy. There was one large fibroid in the uterus and several smaller ones. The surgeon noted that the parametric tissues were more indurated than usual. Her post-operative progress was satisfactory until the seventeenth day when she developed anuria and slight pain in the left loin. On the following day she was cystoscoped and the bladder was normal. Ureteric catheters were passed up both ureters but on the right side the catheter was obstructed at about the pelvi-ureteric junction. On the left side there was a temporary hold-up at the same level but the catheter then passed into the pelvis and urine immediately drained down it. The ascending pyelogram showed a right hydronephrosis with an obstruction at the pelvi-ureteric junction and a slight left hydronephrosis with some irregularity of the upper end of the ureter (Fig. 4). The ureteric catheters were removed immediately after the X-ray but she passed no urine during the next twenty-four hours.

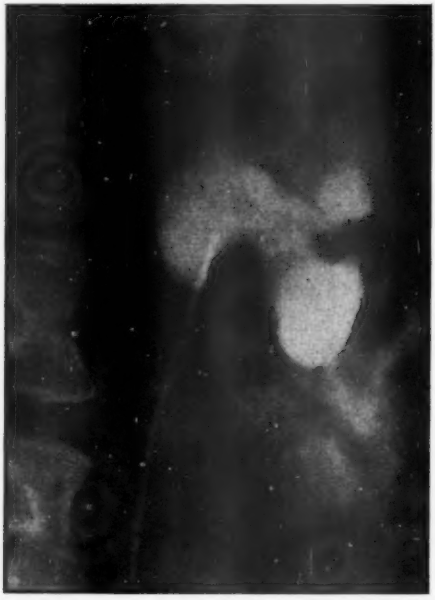

FIG. 4.—Left ascending pyelogram, Case III, showing an area of nodularity in the ureter just below the pelvi-ureteric junction. There is some hydronephrosis.

On the following day a left nephrostomy was performed. At this operation the kidney looked almost normal but the pelvi-ureteric junction and upper part of the ureter were found to be firmly adherent to the vertebral bodies close to the aorta and were surrounded by scar tissue. A small portion of this was removed for histology.

She died within twenty-four hours of the operation probably because of a high blood potassium. Histological examination of the tissue removed showed that it was a plaque of fibrous tissue which included part of a small blood vessel.

These 3 patients were all thought to be suffering from the same disease but its exact nature is uncertain. 6 similar cases of bilateral ureteric obstruction have been reported previously (Ormond, 1948; Amselem, 1950; Ewell and Bruskewitz, 1952; Miller *et al.*, 1952; Bradfield, 1953; Chisholm *et al.*, 1954) and two cases of unilateral ureteric obstruction which may be examples of the same disease (Oppenheimer *et al.*, 1952; MacLean, 1954). All have very complex histories which are difficult to review in a short space but certain general principles about the disease can be deduced.

(1) *Evidence that the Ureteric Obstruction is Incidental to a Disease Arising in the Mid-line*

The fact that both ureters may be pulled towards the mid-line suggests a lesion arising between them. 4 of the reported cases support this idea. The first 2 were reported by Ormond (1948). Both patients developed anuria during the course of somewhat inconclusive investigations for chronic backache. The first patient had bilateral nephrostomies which were closed when he began to pass urine normally. He died three-and-a-half years later from uræmia and anæmia and at the post-mortem his kidneys were found to be completely destroyed by back pressure and infection. This was the result of retroperitoneal fibrosis surrounding the aorta and including the ureters.

The second patient had a laparotomy at which a retroperitoneal flat mass with indistinct lateral margins was felt covering the sacral promontory and the ureters passed through it near its lateral margins. They were dissected out of the fibrous tissue and after deep X-ray therapy he made good recovery.

A third case suggesting a mid-line origin was reported by Miller *et al.* (1952). This patient also had a laparotomy and differs from the others only in that the inflammatory tissue formed a larger mass and was palpable in the umbilical region before operation. The ureters, although embedded in the mass, were not freed from it and urinary drainage was maintained by ureteric catheters for two weeks. The abdominal mass was still palpable nearly two years later.

A fourth case reported by Chisholm *et al.* (1954) had a bilateral ureterolysis done in two stages. The appearance on each side suggested that the ureters were obstructed by a thick fibrous sheath perhaps arising from fascia over the psoas laterally and extending across the ureter to disappear over the vertebral bodies medially. They quote an anatomical dissection reported by Daseler and Anson (1943) in which a body with bilateral ectopic kidneys appeared to have a fibrous sheath enveloping the great vessels and the ureters.

(2) *The Nature of the Inflammatory Process*

Although this disease is thought to be inflammatory, there are certain unusual features about it. Firstly the only reported case in which a primary infective focus is suggested was in a patient who had ulcerative colitis for nine years before the ureteric obstruction occurred (Chisholm *et al.*, 1954). Secondly, pyrexia does not seem to be a feature of the disease. This was particularly so in the patient who had the palpable abdominal mass (Miller *et al.*, 1952) for, although a biopsy showed the presence of small abscesses amongst chronic inflammatory tissue, he had no fever until ten days after his operation. Thirdly, in none of the cases is there any mention of enlarged lymph glands. The appearance of the fibrous tissue engulfing and infiltrating the ureters shows that it is of a highly active type and not really like that which occurs during the healing of acute or chronic bacterial infections.

It is worth mentioning that the obstruction of the ureters in these patients is not always demonstrable as a mechanical block on ascending pyelography. In fact in some of the patients, even when anuria had developed, both ureters were catheterized with ease and it seems likely that when a ureter is surrounded by fibrous tissue, peristalsis may be prevented. A similar state of affairs sometimes occurs with extensive malignant disease on the posterior abdominal wall.

(3) *Unilateral Ureteric Obstruction*

Two examples of unilateral ureteric obstruction have been reported which seem to be the same disease. In one (MacLean, 1954) the left ureter was densely bound down where it crossed the iliac bifurcation and for a distance of about 5 cm. below this point. The other (Oppenheimer *et al.*, 1952) had a similar obstruction on the right but it extended almost to the bladder. Although the disease in these unilateral cases appeared to be at a different site from the bilateral cases, its description as being where the ureter crossed the iliac vessels is interesting and suggests that the disease might originate as an arteritis. This is supported by evidence from a fourth patient in whom what appears to be the same disease presented

with an acute arterial block. She is a woman of 51 who had a hysterectomy for fibroids one year before. Thirteen days after the operation she developed pain and pallor in the right leg and an aortogram showed a complete block of the right external iliac artery just at its origin. Some months later Mr. H. Shucksmith, to whom the patient had been referred, exposed the right iliac arteries with the idea of replacing the blocked artery with a graft. The operation report reads as follows: "Considerable fibrosis about bifurcation of right common iliac artery involving right ureter." The whole of the external iliac artery was found firmly thrombosed and no graft could be used.

SUMMARY

(1) Three case histories are reported of patients who developed oliguria or uræmia due to obstruction of the ureters by an invasive type of fibrosis which seemed to originate around the main vessels on the posterior abdominal wall.

(2) The previous literature is reviewed.

(3) The evidence that the disease is primarily arterial or periarterial is supported by a fourth case history of a patient in whom the disease presented as an arterial block.

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An Assessment of Sodium Acetrizoate and an Experimental Basis for its Use in Intravenous Pyelography [*Summary*]

By P. G. KEATES, M.D., M.R.C.P., D.M.R.D.

20 c.c. of 70% sodium acetrizoate were injected into 5 normal patients who had been deprived of fluid for more than fifteen hours. The average maximum concentration was reached about ten minutes after injection and the best period for radiography was from 7 to 20 minutes after injection. The urine iodine content was about twice as high with this medium as with diodone.

A controlled comparison of 20 c.c. 70% sodium acetrizoate in which a number of patients were each examined with both media showed that sodium acetrizoate produced better and more dense pyelograms.

The diuretic effects of various doses and media were studied. Good filling of pyelograms seems to depend on an adequate rate of urine flow, and is probably related to fluid pressure within the pelvis and calyces.

70% sodium acetrizoate is a local irritant and perivenous leakage is to be avoided. No other serious difficulty in its use was found.

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Section of Psychiatry

President—W. MAYER-GROSS, M.D., F.R.C.P.

[*March* 8, 1955]

The Amsterdam Psychiatric First Aid Scheme and Some Proposals for New Legislation

By Professor A. QUERIDO
Amsterdam

IT is not astonishing that in similar cultures parallel trends of development can be discerned. In former times these developments might take parallel courses without ever touching and therefore without any mutual influence; in our present-day world with its almost instantaneous and total communication we find that as a matter of course social and cultural developments in widely different parts of the globe exercise a mutual influence. This cross-fertilization may cause hybrids of doubtful value, but if the original cultures, the matrices of the development, so to speak, have strong common trends, the contact may be mutually stimulating and to the advantage of either development.

England and Holland both consider the dignity of man and the freedom of the human being as the base of their social institutions.

It is no exaggeration to say that the attitude of society towards the insane is an indication of the general level of humane feeling that prevails in that society.

There are three stages in the concern of society with its insane. The first, the origin of which is lost in time and which ended only in the beginning of last century, has no other tendency than to protect the community against the dangerous lunatic; in the second stage, next to the attempt to provide protection against the insane, we find the tendency to protect the individual against the aggression of society. In the first stage the law enables you to lock up the mad murderer, in the second stage the law wants to make sure that only mad murderers are locked up. Now there are many madmen and only a few mad murderers and that is—perhaps a little crudely put—the fundamental problem that concerns us now. For, as in the latter half of the last century it became more and more clear that insanity was an illness which could be improved by treatment, so to-day the purely medical aspects of the problem tend to replace the legal ones. It seems a paradox that the greater the number of patients that can profit from medical treatment and the more possibilities arise for the betterment of mentally disturbed patients, the less it becomes necessary to make use of the machinery of the law.

Finally we have to face the situation in which the law concerning the mentally ill becomes more or less archaic. There is still a complicated machine for the protection of society against the dangerous madman and for the protection of the individual against arbitrary hospitalization against his wish, but the very large majority of cases by-pass this machine because they do not offer any problem that is relevant to it.

In England with your great respect for the law you have adapted your procedure more or less to the actual circumstances, giving the patient who submits to treatment of his own free will a status which is only slightly different from that of the sufferer from any other disease. In Holland we left the law as it stood, making use of it in only a small number of cases, and for the rest dealing with the mental patient in the mental hospital as with any patient in any other hospital, that is to say without any legal interference. This part of the development is in both countries almost exactly similar and in both countries we are now faced with the problem whether our law concerning the mentally ill is merely a museum piece. Here, however, our paths seem to diverge.

We both have experience of treating the mental patient without compulsion or legal safeguards in the hospital, but perhaps a contribution can be made by the Dutch side on the treatment of mental patients in society.

The attempts to deal with the mental patient in his own home or in his natural surroundings started from economic necessity. In the years of the economic crisis it became imperative

to cut down the expenses of public bodies, and since the rate of admission to mental hospitals had been rising enormously after the First World War the question was put whether it was possible to decrease the number of inmates in some way or other.

Since the city of Amsterdam does not own any mental hospital, the discharge of each patient would mean a real saving. An analysis of the patients placed in the course of the years in various hospitals was first made, and it was found that about 10% could be discharged, provided certain conditions could be fulfilled. These conditions usually were of a social type: the provision of a home, maintenance or clothing. Since it was in the period of the great depression, the question of work did not play an important part.

This period of rehabilitating chronic patients, which lasted about two years, gave us the first experience of dealing with the mental patient in society. We then started a programme of prevention—not, of course, of mental illness as such, but of hospital admission. In order to do this a twenty-four-hour service was set up. Any patient seeking admission was first seen by the city psychiatrist.

Let me give you the background against which this work was carried out.

Amsterdam, with 850,000 inhabitants, has no mental hospital *per se*, but there are 300 clinical psychiatric beds, 200 of which belong to the University Hospital. It has two large out-patient departments belonging to the University Hospital and one other hospital, 20 polyclinics in which a number of specialists work together for the insured part of the population, two centres for psychotherapy and three child guidance clinics. There are about 50 psychiatrists in practice in Amsterdam.

When the family doctor or the specialist asks admission for a patient who is mentally disturbed or when the police or any other public body has to deal with a person who seems to be a mental case, the call is referred to a central point which informs the city psychiatrist on duty.

According to the nature of the call he sees the patient either immediately or within twenty-four hours and on the spot where the trouble occurred. If clinical observation seems to be indicated the patient either enters a psychiatric ward, or goes direct to a mental hospital (this latter never happens with a new case), or he may decide that no admission is necessary and the patient remains under supervision. When legal measures such as an emergency order or certification are unavoidable, they are initiated by the bureau of the city psychiatrist.

The chief psychiatrist visits the psychiatric clinic four times a week. The mental hospitals are also regularly but less frequently visited.

The city is divided into a number of sectors; for each sector a psychiatrist is responsible together with 2 or 3 social workers. The total load of cases for each team is about 400.

The supervision is carried out by visits to the patient's home. Patients under supervision may have been discharged from an institution, they may have been in the psychiatric ward of the hospital, or they may never have been in a hospital at all. No distinction is made between mental illness and mental deficiency. The consultation bureau also gives advice to the public assistance office, the city housing bureau and the labour exchange. The bureau provides home help, placement in home care, sheltered workshops with a capacity of about 300, assistance in finding work, in procuring clothing, tools and the provision of financial support.

No treatment in the medical sense is given by the bureau but patients are referred to the family doctor, polyclinic or out-patient department.

The total number of contacts is at present about 8,000 a year; the personnel numbers 45.

The function of the bureau is to assess the problems and difficulties of each patient, to estimate the amount of social pressure he can stand and to relieve him from such burdens as he is unable to bear. Therefore, the material aid he may receive is to be regarded as medicine, to be dispensed according to his need.

The influence of this work on the general public and on the workers in other services has been very marked. The first attitude of the non-initiated towards the mentally ill is one of fear and aggression. The psychiatrist demonstrates that by treating the patient kindly and sensibly it may be possible so to reduce the existing tensions that they can be dealt with. The sensation seekers leave off, shamefacedly, and instead of a screaming bundle of misery, dragged off towards the ambulance on a stretcher or struggling between two massive policemen, the patient accompanies the doctor without any coercion or may even be left at home when things seem to have been smoothed over. It goes without saying that such occurrences are apt to change the concept of insanity in the layman. It is, of course, a condition for the success of this part of the work that the help is always readily given, that time is put liberally at the disposal of those seeking help, and that the case is almost never closed by the administration of first aid alone, but has to be followed up. Thus the direct contact with the patient and his relatives in his natural surroundings is of great importance.

As to the effect of this work on the patient himself, I must point out first that there are about 2,500 under supervision, and a similar number are in mental hospitals. I would not say that all these 2,500 would have to be sent to hospital next week if this service stopped to-morrow. If the hospitalization of 4 in 1,000 inhabitants satisfies this need (mental deficiency excluded), then we in Amsterdam are far below this figure, but we seem to have reached a state of equilibrium, since no pressure is put on the admission apparatus. In other words, with the help of this service the needs of about one-third of all patients, who would otherwise be in need of hospitalization, seem to be supplied.

Undoubtedly the length of stay in the hospital is also markedly influenced by the action of the service; this, however, will be compensated by a more rapid turnover of patients.

Furthermore, the service is aimed at the psychotic and the mental deficient and not at the neurotic, for whom the main question is the provision of psychotherapy. For those in need of medical treatment, convulsant therapy or insulin, medicinal treatment or lobotomy, the clinical wards of the hospital are indicated. Again, occupational therapy for the mental patient can be found best in its systematized forms in the mental hospitals. However, the final test for recovery and satisfactory adjustment lies in the adaptation of the patient to his social relations and, in the last analysis, this can only be carried out and tested in society: the mental hospital can be no more than a surrogate of those.

The majority of the patients under supervision are therefore those sufferers who probably would make a good adjustment in the hospital but who would stick at that stage if no other measures were taken. Schizophrenics, epileptics, some forms of paranoia, various types of psychopathy and hysterical personality, senile conditions, a few cases of general paralysis are, next to the mental deficient, the type of patient under supervision. The work is partly curative, inasmuch as it tries to overcome the results of the disease, and partly educative, in that an adjustment is sought between the deficiencies of the sufferer and the demands of his surroundings. It makes use of two groups of possibilities: one given by the establishment of personal relations, and one given by the employment of social methods.

Finally, what does this kind of activity mean to the psychiatrist and what does it do to his outlook on psychiatric problems? The vast difference existing between the investigation of a patient under hospital conditions and in his natural surroundings cannot be sufficiently stressed. In the hospital we have to deal with an isolated person, and we start our observation after this isolation—which in a certain sense is a depersonalization—has taken place. Any observations we should like to extend to his relations become in truth additional, inasmuch as they can be added to the clinical work, but they have very little chance of integration.

When investigating the patient at home, especially at a very early stage, we have the advantage of observing the conflict as a complex occurrence in which the personality of the patient and the symptoms of his illness play an important part, but in which at the same time we can observe the interplay of all that is related to the conflict; we note the quality of the surroundings, we feel the influence of wife and children, we see how the patient is feared, loved or resented, we note the burden of material care that rests on the family, we see the tensions caused by bad living conditions or poverty, we note the reactions of the neighbours, the attitude of the patient towards authority, we see signs of hobbies, of interest in cultural or social activity, and all this lies as one integral picture before us during our visits to the patient in his home.

We may find the most powerful means for his future readjustment in the love he may feel for a child, in the self-sacrificing attitude of his wife, in his interest in tropical fish or in his garden.

From this angle the psychiatric problem in its narrower sense does not remain the central problem. The psychiatrists who have been working for some time in this field experience a sense of relativity in regard to the clinical problems. It no longer seems so very important to ascertain this clinical diagnosis or that, to differentiate between one clinical entity and another. It seems more important to evolve a dynamic picture in which the illness is one factor, interacting with the total of the related conditions of which the patient is a node, rather than to reach a clinical diagnosis. This activity, of course, has to take place against a background of solid psychiatric knowledge, so that no possible treatment is overlooked; the service does not seek to replace any of the other therapeutic possibilities, it does not claim to render the psychiatric arsenal superfluous, but it seems to be an addition to this arsenal.

Now perhaps it is understandable that the experiences gained in this way in Amsterdam and other places were taken into account when legal changes in regard to mental illness were contemplated after the war.

We both have the wide experience of the possibilities of voluntary treatment and the superfluity of the legal machine in relation to the majority of mental patients. But where in England you seem to be chiefly concerned with the problems of this voluntary admission

and its possible limits, it is our concern to enable the patients to receive treatment without changing their social surroundings, since we are convinced that this is an essential condition for a satisfactory readjustment.

Therefore the draft of our new bill concerning mental illness—in which again no distinction is made between mental illness and mental deficiency—limits the admission with judicial interference to the exceptional case and introduces a new factor in regulating the relations between the patient and society. The new factor in this bill is in the nature of a guardianship which will enable the patient to remain in society, provided he is willing and able to follow the directions. Only when he does not conform to those directions may he be put in a mental hospital against his wish.

This procedure is based on the conviction that the problems offered by the mentally ill are conditional, that it is not the question of sticking on a psychiatric label and basing any legal action on the nature of this label, but rather one of adjusting the surroundings to the needs of the patient, and giving him help in this adjustment by the provision of a legal guardian. In the draft bill the guardian is not a person but the bureau, which can delegate the actual supervision to an official of the bureau, a member of the patient's family, or any other person deemed suitable, and which remains responsible to the state inspectorate and the judicial body. The bureau itself must conform to certain standards of personnel and administrative organization before being admitted to its task.

This institution of a guardianship is a second line of defence; the first line is the co-operation between the patient, the patient's relatives and the bureau on a purely voluntary basis.

But when, according to the wording of the draft, the patient by reason of mental illness constitutes a danger to himself, to others or to the public order, or when, by reason of his mental illness, he is unable to further his own interests or the interests of those which are legally entrusted to him, he may be placed by judicial order under the guardianship of the bureau which now may give him certain directions about his way of living which he will be obliged to follow. Only when this second line of defence is broken through may the patient be placed in a mental hospital against his wishes on a judicial order applied for and granted to the bureau. Although we have every reason to expect that most patients will co-operate voluntarily with the bureau and the vast majority of those in need of hospital treatment will seek it on a voluntary basis, the projected bill has to deal with the cases in which the freedom of the individual has to be limited, be it by placing him under guardianship or by hospitalization. Since we hold the opinion that only the judicial authority may curtail the rights of the individual, the orders to establish the guardianship and the involuntary hospitalization are to be made out by such an authority. Contrary therefore to certain modern laws concerning the mentally ill, in which all judicial interference has been abolished, we thought it to be in accordance with the principles of our constitution to maintain the judicial influence for those exceptional cases in which co-operation cannot be obtained.

However, the judicial authority is not invited to decide or act on medical matters. It is not for him to decide whether there exists a mental illness or whether this mental illness is so serious that the patient is in need of hospitalization or guardianship. His task will be to decide whether there are social problems, and whether these social problems are grave enough to justify interference with the freedom of the patient.

It is certainly possible, according to the wording of the draft, to impose treatment on a patient who is unable to understand that he is in need of it. Here the gravity of the danger to which the patient brings himself by non-treatment, the harm he can do to others by remaining untreated and the amount of certainty which the treatment offers, have to be weighed against the interference with personal liberty.

The definition of those who could be brought under the bill is very wide indeed; it is envisaged that alcoholics and other addicts can be brought under it.

Our present Act concerning the insane, now seventy years old, defined the mental hospital and obliged the authorities to erect sufficient hospitals with satisfactory standards. It brought psychiatry to a higher level and led to a standard training of mental nurses. This Act was instrumental in raising institutional care and evolving the modern mental hospital.

By the present draft we may expect that in the same way the centres for the social care of the mentally disturbed will be instituted by the authorities in those places where they are still lacking, that these centres will function on such a level that their tasks can be carried out in a satisfactory way, that they will stimulate socio-psychiatric interest and will radiate a mental health influence in the community. By rendering the whole care for the mentally ill more dynamic an appreciable step forward would be taken in the economic management of the problem. This, however, is not the main purpose; we firmly believe that we could advance human happiness and human dignity in this way.

Dr. J. T. Chalmers Keddie (Medical Officer of Health, Oldham C.B.): Professor Querido has outlined his Amsterdam scheme and stated that it started as an economic necessity. We have problems in the hospital service—the rising expenditure and the grave shortage of nurses make it imperative that new avenues of prevention and treatment should be explored. The Commissioners of the Board of Control in their Report for 1953 stress the serious shortage of nurses which resulted in 1,099 beds being out of use during the year. We also know that many staffed beds are seriously understaffed.

Professor Querido advocates, and very rightly in my view, that only in the last resort should the patient be admitted to hospital. Such a scheme is only possible if adequate domiciliary facilities are available and there is the closest co-operation between all the services concerned. Here I do agree that the Act with its divided responsibility regarding prevention and treatment does not assist us.

We all know the problems in the field of mental deficiency. It is my firm view and my personal experience that a comprehensive scheme of care and after-care which includes supervision by social workers, the provision of occupational centres for children and industrial centres for adults will go a long way to solving our problems. In many of these cases the social stress far outweighs the medical aspect, and I would suggest that frequently the defective is primarily a social rather than medical problem.

Oldham is a compact County Borough with a population of 119,100. Within the Borough is the Oldham and District General Hospital with a Psychiatric Unit of 228 beds, which serves Oldham and the adjacent districts. In December 1950, a Consultant Psychiatrist (Dr. Arthur Pool) was appointed to the hospital and in order that the Local Authority Service should be efficient the Health Committee appointed him Consultant Psychiatrist to the Health Department.

We now have complete co-ordination of the curative and preventive services within the Borough. The team of social workers in the Mental Health Department also undertake the social work in connexion with Oldham patients admitted to the Psychiatric Unit. The team comprises a qualified Psychologist and four Mental Health Visitors—three of whom also act as Duly Authorized Officers. The Consultant Psychiatrist holds a weekly case conference with these officers and here all problems are discussed and action initiated.

The Hospital Management Committee has developed and extended the Psychiatric Out-patient Department, and a limited number of selected patients receive day care.

A Mental Health Visitor is always on call throughout the twenty-four hours and immediately attends to any call that is received. These are from the usual agencies; general practitioners, police, anxious neighbours, relatives, &c. The patient is visited and appropriate action taken.

The problem may be met by simple advice, or reference to another department. If there is no immediate urgency then the case is discussed at the weekly case conference with the Consultant Psychiatrist, and as a result: further visits may be requested; a domiciliary visit by the Consultant arranged; an out-patient consultation agreed; in-patient treatment, or day hospital care suggested. At this conference after-care cases are also reviewed. In all cases the general practitioner is kept informed and his approval obtained.

In the more urgent cases the Mental Health Visitor may have to assume his role of Duly Authorized Officer and remove the patient with as little delay as possible, but before doing so every other avenue must be explored. A long chat with the patient or a contact with the general practitioner and the administration of a sedative may ease the immediate situation. The Consultant Psychiatrist may be contacted, or he may be asked for a domiciliary visit. If the patient is removed to hospital the Mental Health Visitor now acting as Duly Authorized Officer must account for his stewardship.

What success has been achieved?

1) There has been a fall in the number of admissions to hospital as the following figures show:

1951	..	169	1953	..	126
1952	..	184	1954	..	128

There is no delay in the admission of an urgent case; no problems of admission and no waiting list. Also there is *a rapid turnover of patients, and no long-stay problems.* Dr. Pool has analysed the patients admitted under his care in 1953 and only one remained in hospital on December 31, 1954.

2) The general practitioners are highly satisfied and no longer demand the admission of a patient, but refer the case to the Mental Health Visitor with a request to visit.

(3) The Consultant Psychiatrist is well pleased. In the majority of cases he is aware of the case before admission.

(4) The reduced admissions from the Oldham authority have resulted in vacant beds in the Psychiatric Unit being used by the Manchester Regional Hospital Board for cases from other areas, thus easing the Board's problem.

(5) The social workers realize they have an important part to play and are part of the team. They are inspired by the close contact with the clinician.

(6) The patients' relatives are grateful that admission to hospital is avoided.

The provision of day care meets a real need and saves hospital beds, but throws additional responsibility on the ambulance service.

Dr. Alexander Walk said that he had been asked to speak on those aspects of Dr. Querido's address which were concerned with new legislative proposals. These might profitably be discussed under three heads:

First, there was the fact that the proposals envisaged a single comprehensive law, identical for all forms of mental abnormality. In this country we were so used to the existing divisions that we took it for granted that they should continue. But fifty years ago one great attempt had been made to remodel our legislation in the same sense. The report of the Royal Commission of 1904–08, known as the Radnor Commission, had recommended a single law and a single term—mental defective—to include every kind of mental abnormality; within this general grouping they recognized different categories, which they defined with the object of implying differences of treatment and discrimination in disposal. Their categories were: (1) Persons of unsound mind (formerly "lunatics"). (2) Persons mentally infirm. (3) Idiots. (4) Imbeciles. (5) Feeble Minded. (6) Moral Imbeciles, and others. They aimed at enabling "protection to be given to many persons who are not lunatics nor idiots and require very different treatment from either". It might well be that these proposals ought to be looked at again, and that the answer to some of our present perplexities might lie in a more comprehensive legislation rather than in maintaining or extending the present rigid divisions.

Secondly, there was the proposed two-stage procedure—the setting up of recognized organizations for the care and guardianship of patients; the emphasis was on continuous community care, with hospitalization only an episode. This was admirable, and not very different from what might be done here under the existing law by an efficient local authority's mental health service; the exception was that, apart from mental defectives, there was no provision here for guardianship, and the only way to secure any kind of statutory supervision of a psychotic patient was to have him in hospital first as a certified patient and then send him out on prolonged trial. Perhaps it would be wise to extend the principle of guardianship to psychotics when our own legislation was revised.

The third striking feature of the Dutch proposals was the retention of a judicial procedure, both at the guardianship and at the hospitalization stage, whereas in this country medical opinion was rather in favour of eliminating this as far as possible. The magistrate's intervention under our present law was largely useless; he did not protect the patient from admission to the mental hospital, for this could be done by the Duly Authorized Officer under Sec. 20 or under an Urgency Order; nor against prolonged detention, since he took no part in the making of renewal orders; and his Reception Order could be nullified at once by either the Medical Superintendent or the relatives. The magistrate was a layman, his jurisdiction was mainly criminal, and therefore resented by patients who felt that they had "done no wrong". The evidence put before him was merely a certificate of insanity, with the implication that an insane person necessarily required to be locked up. In Holland on the other hand, the magistrate was a professional Judge, sitting in a civil, not a criminal court; he was to be brought in at every stage—for guardianship, admission, extension of order and discharge, and his consideration of the case was both more informal and based on fuller evidence of the social circumstances of the individual. Moreover the same court dealt with the management of the patient's affairs, so that the Judge was more akin to the Master of the Court of Protection in England. It might be that such a judicial procedure would be more acceptable than the present one in this country.

Dr. J. C. Sawle Thomas: The comprehensive scheme of psychiatric care and after-care which Dr. Querido has evolved for Amsterdam is greatly to be admired and we can learn a great deal from his methods and experience but, as he has said, conditions in our respective countries are very different and we have to adapt our own methods to existing facilities

while at the same time trying to reframe legislation in a sufficiently flexible manner so that it can be modified and adapted as progress in buildings, equipment and methods of treatment takes place.

I have already heard the criticism made that some of the proposals for new legislation put before the Royal Commission remain too close to the existing order of things, but I do not think that the time is yet ripe for a revolutionary change, which would inevitably mean enormous expenditure on new buildings and the adaptation of those which already exist. It would seem better rather to build on the old foundations and to modernize our architecture in the light of changing conditions and new approaches to mental illness. We could do worse than bear in mind the Festival of Britain site which combined modern conceptions of beauty with ease of demolition. One of the greatest faults of the past was too rigid a formula, together with too substantial buildings which cannot easily be brought up to date. It is also essential to devise a form of legislation which is applicable to the whole country. It is comparatively simple to organize a mental health service for a compact, thickly populated community, especially if only one Local Authority is involved, but it becomes a much more difficult and complicated problem when one has to deal with a scattered rural area with many small towns and villages.

It seems to me that the one essential in which the Amsterdam service differs from anything in this country is in having a large, well-staffed and well-equipped university clinic which is intimately linked with both the domiciliary service on the one hand and the mental hospital on the other. With the exception of the Maudsley Hospital there is nothing in this country of a comparable kind, and our teaching hospitals are altogether too remote from the mental hospitals, their in-patient units, if they exist at all, are too small and the domiciliary service connected with them is, to say the least, not very fully developed. A few psychiatric units have been established in non-teaching general hospitals, but the number is very small and apart from a very few specialized hospitals such as the Belmont and the Cassell there remain only the large mental hospitals to cater for all types of mental illness. This might not matter so much if the latter were adequately equipped to cope with their task, but with a few exceptions the average mental hospital is remotely situated, has antiquated buildings, is short of both medical and nursing staff and has too little contact with the outside medical world. Nevertheless, in spite of these very severe handicaps the standard of psychiatry throughout the country is remarkably high and reflects great credit on all those responsible for it, but how much better it could be if the available facilities were improved.

London presents its own particular problems and I will return to them later. On looking at the country as a whole I would say that what is needed is a psychiatric unit attached to each of the larger general hospitals, that is serving a population of approximately half a million. Such a unit would need about 60 beds comprising two small wards for acutely disturbed patients of either sex, wards for the treatment of early psychoses, and separate accommodation for neuroses. It should be so equipped that all forms of psychiatric treatment could be carried out, the patients could remain up to a maximum of say six months, after which, if still in need of care, they could be transferred to the mental hospital. The unit should be staffed, and this is most important, from the mental hospital with the addition, where possible, of visiting psychiatric consultants from the university centre. Methods of admission will be covered by the type of legislation proposed by the R.M.P.A. and B.M.A. in their evidence to the Royal Commission.

It has been argued that the establishment of such units would tend to convert the mental hospitals into chronic dumps. This need not be the case if the close liaison between the two which I have envisaged actually takes place. The medical staff would be working in both hospitals and the nursing staff could be made to rotate, so that all had a share in both acute and chronic work. It might even give a stimulus to the treatment and rehabilitation of the chronic patient since those working with him would be able to devote more time to his own peculiar problems.

So far as London is concerned I would like to see the same type of organization linked with the teaching hospitals. Here, however, the unit would need to be larger, preferably in the nature of 200 beds for each of the metropolitan regions, so that in fact they would approximate very closely to the clinic in Amsterdam. These units would be ideal for teaching and research and would go a long way towards raising the status of psychiatry as a whole and integrating it with general medicine. I would hope that if such a plan were to materialize the old observation ward as we now know it would completely disappear, and I gather that nothing of such a kind exists under Dr. Querido's scheme. It is an anachronism and should have no place in any modern psychiatric set-up. The observation ward reflects the old approach to psychiatry which regarded any mentally ill person as a lunatic without sense or sensibilities. How else could one excuse the admission of senile

dements, acute manias, alcoholics, eccentric vagrants and hysterics side by side with adolescent depressions, early schizophrenias and so on, with no possibility of segregation and only the barest minimum in the way of treatment. The observation ward is a convenient dumping ground for those who cannot be bothered to make a crisp decision or who shrink from the responsibility of advising admission to a mental hospital.

In the great majority of cases it should be possible to come to a decision straight away as to what kind of psychiatric help the patient needs—mental hospital, general hospital, unit, neurosis centre or whatever it may be—and to act accordingly. Nowadays with the availability of domiciliary visits by psychiatric consultants the observation ward has ceased to have any real function, and the fact that it is thought by some to be administratively convenient does not, in my view, outweigh the harm which may be done to a sensitive patient. The establishment of psychiatric clinics such as those which have been described would, I hope, finally do away with any excuse for the old observation ward.

I do not believe that the intervention of a central controlling authority such as the bureau described by Dr. Querido would find favour here, not least because it would seem to exclude the general practitioner from any say in the matter. It has long been the custom for general practitioners to get into direct touch with the consultants of their choice or if they wish to get a patient into hospital to approach the hospital itself, when they will be offered either admission, an out-patient appointment or a domiciliary consultation. I still feel that this is the best method and I cannot see any benefit to be derived from bringing in the Local Authority at this stage, in fact it would only lead to unnecessary administrative entanglements. Naturally the services of the Duly Authorized Officer will continue to be called upon in the case of temporary or certified patients, although in the former category the applicant need not necessarily be a Duly Authorized Officer.

Another feature of the Amsterdam proposals which strikes me as open to criticism is the fact that although the City Psychiatrist does not himself carry out any active treatment he is the sole arbiter of the patient's destiny. While I do not for one moment doubt the psychiatric competence of the City Psychiatrist, if one is not in constant touch with treatment and its effects can it be said that one is best fitted to decide whether a patient shall be admitted to hospital or remain at home? Especially if diagnosis is to be ignored and social adaptation be made the sole criterion. After all it is in the earliest phases of illness that treatment may be most effective but social adaptation is by no means lost. Too much can be made of the environmental factors both in the promotion and prevention of mental illness. In many cases a change from home surroundings is an essential part of treatment.

There would seem also to be a danger of overspecialization among psychiatrists. In the scheme as described there are three types of psychiatric specialist: (1) the City Psychiatrist, who is primarily an administrator who deals with the problems of the community but does no treatment; (2) the clinic or acute hospital psychiatrist who is responsible for diagnosis and active treatment; and (3) the mental hospital psychiatrist who deals only with chronic patients and has no extra-mural duties whatever. This last strikes me as particularly soul-destroying and I cannot believe that it would attract any other than those who had little active psychiatric interest and a desire to live in professional isolation. So far as we are concerned it would mean putting the mental hospital back by about thirty years to a position from which it has slowly and painfully evolved. It is now coming to be regarded as a place where patients may go freely for treatment and where the highest psychiatric standards are upheld both in treatment and research.

It is regrettable that in framing new legislation no provision has been made for the separation of the mentally ill from the mentally defective. In fact this lack of differentiation makes it difficult to assess Dr. Querido's proposals at their true value. The methods of approach must necessarily vary greatly according to which class of patient one is dealing with; for example, whereas the methods of community care described are of unquestionable value in the case of the defective they may be even dangerous in that of the mentally ill. As I have already indicated, and it would be instructive to know what proportion of the 2,500 cases under supervision are in fact mental defectives.

I entirely agree that community care is especially important in the case of the high-grade defective and unstable handicapped personalities. This is clearly a function of the Local Authority and the proposals for their supervision and employment could scarcely be better. It seems more than ever a pity, therefore, that differential legislation could not have been formulated at the same time.

BOOK REVIEWS

The Casualty Department. By T. G. Lowden, M.A., B.M., B.Ch., F.R.C.S. (Pp. viii + 278; 170 illustrations, 12 in full colour. 37s. 6d.) Edinburgh and London: E. & S. Livingstone Ltd. 1955.

The last twenty years have seen a striking slump in the popularity of the post of casualty surgical officer, which previously had been an almost routine step on the road to a surgical staff appointment. The causes of this unpopularity are many, but two of the most important are firstly, the isolation in which casualty officers in so many casualty departments have worked; and secondly, the reduction in the amount of interesting material passing through them owing to the development of special clinics such as fracture clinics. Mr. Lowden shows in this book that casualty work can still be most varied and rewarding, and by the interest that as a consultant he obviously still takes in this work he sets an example to other consultants, who so often regard the casualty department merely as a happy hunting ground for their own particular interest.

The book may be divided into three almost equal parts. The first part deals with septic conditions. The three cardinal principles of modern treatment are emphasized—chemotherapy, surgical débridement, and early epithelial closure. Particular stress is laid not only on "letting pus out" but on "getting pus out" together with all necrotic tissue in the wall of the abscess, and to achieve this the wall of the abscess cavity is abraded by the curette or by a piece of gauze. But in spite of the evidence which the author provides for the success of treatment on these lines, many surgeons would still be too conservative to curette the abscess below the lower eyelid illustrated in his Fig. 4. In the treatment of carbuncle, no mention is made of magnesium sulphate paste which many casualty departments find most valuable as a local application. The septic hand is considered in detail, and it is a pleasure to see this subject considered on a basis of actual experience and the obsolescence of much of Kanavel's work stressed. The section on pulp infections and paronychia is particularly good.

The second part of the book deals with closed soft tissue injuries, soft tissue injuries with breach of surface, burns and scalds, and concludes with a chapter on the cold case in which hints are given on the treatment of numerous conditions varying from sebaceous cysts to ingrowing toenails. The last part of the book deals with the question of organization, disposal, and legal responsibilities, which recent events have brought to the fore.

The whole work illustrates clearly the author's wide experience and interest in casualty work, and will be most valuable to those for whom it was primarily written—casualty surgical officers and prospective casualty surgical officers. It will also repay study by senior surgeons who are responsible for advising Boards of Management on casualty department matters. But it is a pity that the author has not learnt the virtue of brevity. Of this book as of many others it can be said that if it were half as long it would be twice as good. Perhaps some time in the future the author will produce a synopsis of this work and earn the further gratitude of harassed casualty surgical officers.

Studies on Fertility. Including papers read at the Conference of the Society for the Study of Fertility, London, 1954. Being Volume VI of the Proceedings of the Society. Edited by R. G. Harrison, M.A., D.M. (Pp. ix + 151; illustrated. 21s.) Oxford: Blackwell Scientific Publications. 1954.

The book is a collection of original papers which forms the annual report of the Proceedings of the Society for the Study of Fertility, and is published this year for the first time in book instead of magazine form.

There are sixteen selected papers which cover a wide aspect of mammalian fertility. A number of these are highly specialized and only of interest to those who make a particular study of the subject from all angles, while others are of importance to the clinician who is interested in the investigation and treatment of human subfertility.

Among these the papers of Raoul Palmer on Cœlioscopy as applied to the problems of sterility and of Dorothy M. Shotton on the management of pregnancy in the previously infertile woman are of particular interest, though Miss Shotton might have given more space to her deductions from her carefully compiled statistics. The paper of E. J. Farris of Philadelphia on the value of timing of ovulation is based on 100 cases in which women became pregnant as a result of donor insemination. Whilst this is scientifically interesting it involves an approach which is not likely to find much approval in this country.

The volume is well produced and printed and the illustrations are excellent. Unfortunately there has been no attempt to correlate the various papers which are printed in an

order which seems to have happened by chance and is most irritating to the reader. As the Proceedings of a year are published together it gives an opportunity for arrangement of the papers under various headings, a procedure which the editor might well consider in future editions.

Current Therapy 1955. Edited by Howard F. Conn, M.D. (Pp. xxx + 692. 77s.) Philadelphia and London: W. B. Saunders Company. 1955.

This book, a fresh edition of which is to be produced annually, is designed in an attempt to help practitioners to keep pace with the constant and rapid advances in therapeutics. It is not, however, an omnibus of treatment as the measures that are recommended have been carefully selected and are critically examined.

When more than one scheme of treatment or point of view is held they are given severally, usually by different contributors. The management of peptic ulceration provides an instance of this where a detailed dietary and drug regime is accompanied by a far simpler and more modern system.

Although it is perforce assumed that the correct diagnosis has been achieved before the book is consulted, a brief and helpful summary of the problem as it is understood at the present time is given in some instances.

The book encompasses skin and venereal diseases, some gynæcological conditions and ante- and post-natal care, as well as general medical disorders. Since the book is primarily intended for physicians, discussion of surgical procedures is confined to their value, and technical details are excluded. The treatment of psychiatric disorders is also considered, but for the most part briefly and in a manner that would not give any more help in the management of an actual case than can be found in the average textbook.

From the point of view of the reader in this country the book has one obvious and very real disadvantage in that it naturally refers to preparations that are in general use in the United States but are in many instances unfamiliar over here. This difficulty is in part met by the listing at the end of the book of the proprietary preparations mentioned in the text, together with some data concerning them. This is not, however, invariably sufficient to supply the reason for advising the drug, and it is burdensome to be compelled to turn frequently to the end of a somewhat cumbersome book.

The text is, however, commendably clear and concise, few words are wasted, and the information that is required can be rapidly obtained. The eminence of the contributors, though a large number, ensures, moreover, that this information is both specialized and authoritative.

British Practice in Radiotherapy. Under the general editorship of Sir Ernest Rock Carling, LL.D., F.R.C.S., F.R.C.P., F.F.R., B. W. Windeyer, M.B., B.S., D.Sc., F.R.C.S., F.R.A.C.S., F.F.R., and D. W. Smithers, M.D., F.R.C.P., F.F.R. (Pp. xii + 549; illustrated. 85s.) London: Butterworth & Co. (Publishers) Ltd. 1955.

An account of the practice of radiotherapy in Great Britain has long been awaited. A real attempt is made in this book to show what can be offered to patients at the present time. A general view of the specialty is presented although each section is written by a different contributor; individual preferences have not been unduly stressed. The importance attached to the increasing co-operation in Britain between the radiotherapist and his medical colleagues is emphasized by the collaboration of a surgeon or of a physician in each section.

The book is divided into two main parts. The first deals with general problems in radiotherapy; a lucid account of dosage and measurements is given by the physicists, followed by a section on the biophysical basis of irradiation. Several articles are devoted to the description of the various techniques employed in treatment by alpha, beta and gamma rays as a local application or with gamma rays for external radiation by a radium beam or by radioactive isotopes. There is an important section on the safety and protection of the radiotherapist and of his staff, of the patient and of the public, which deserves to be studied by all people in charge of radiological workers. The final section in this part of the book is devoted to the work of the radiographers; it rightly stresses the great effect the qualities in the radiographic staff can have on the tone and efficiency of the radiotherapy department.

The second part of the book is devoted to treatment, each section being written by different contributors; it deals with the treatment of neoplasms in nearly all the sites in which they occur. Not all the diseases discussed are malignant; some benign conditions such as ankylosing spondylitis, in which radiotherapy is the treatment of choice, are included. A comprehensive view of the practice of radiotherapy in England to-day is presented, including very useful information on prognosis after treatment. The book is beautifully printed on good paper, and the illustrations are admirable. All radiotherapists should have this book: so also should all doctors who are interested in the treatment of malignant disease.

Social Casework in Marital Problems: The Development of a Psychodynamic Approach. By Kathleen Bannister, Alison Lyons, Lily Pincus, James Robb, Antonia Shooter and Judith Stephens. (Pp. xii + 199. 15s.) London: Tavistock Publications Ltd. 1955.

After the war the Family Welfare Association, in co-operation with the Tavistock Institute of Human Relations, established the Family Discussion Bureau in London. Its aims were to provide a service for people seeking help with marriage problems, to devise appropriate techniques and methods of training caseworkers, and to study the interpersonal relationships involved.

This interesting and stimulating book describes the first five years of this experiment, which started in 1948. A group of about six experienced social workers with academic qualifications participated in what is essentially team work, with the co-operation of psychoanalysts. The clients, numbering 1,420 and representing 1,126 marriages over the five-year period, came mainly on referral from other agencies. Each person was seen by his or her "own" worker and the highest importance was attached to the regular discussion of cases within the group of workers. The development of this group method, both as a means of handling clients and of training workers, forms the central concept of the book, and this theme is particularly well described.

Throughout a high standard was set, and the Bureau was primarily interested in that 30% of the clients who attended for more than three interviews. The emphasis is almost entirely on psychological and emotional motivations with only a passing reference to other factors such as gynæcological conditions. The central part of the book consists of descriptions of representative cases and their non-directive handling by caseworkers. The work amounted in fact to lay psychotherapy though the term is not used. As such, it is open to the usual criticisms of lay psychotherapy such as the possibility of organic disease being undetected, for the medical psycho-analysts who strengthen the group discussion of workers do not themselves see any of the clients. The case sheet reproduced in the appendix goes into considerable detail without any mention of the family doctor, who would in some cases have relevant information.

There is much of value and importance in this book for those concerned with marital conciliation to whom it should be essential reading. If it does not carry entire conviction this arises both from the experimental nature of the work and from certain apparent confusions. It is, for instance, emphasized that the main theme of the book is the development and use of social casework methods and techniques, the particular problems of marriage and family relationships being relevant only in so far as they are necessary for the exposition of the main theme. To this end there is a careful selection of that minority of cases that are amenable to the methods described. Yet the descriptive chapters appear to claim that this is client-centred therapy rather than method-centred. Again, in adapting the methods of psycho-analysis and in using different workers to interview husband and wife, there is a marked emphasis upon the treatment of the individual that is never quite reconciled with the clear opening statement that for the Family Discussion Bureau the unit was not the individual but the marriage, and behind it the family. The very index, which contains 11 entries for Family Discussion Bureau, 9 for workers and 4 for individual, makes no reference to marriage.

The Technique and Significance of Œstrogen Determinations. Edited by P. Eckstein and S. Zuckerman. Memoirs of the Society for Endocrinology, No. 3. (Pp. 96; illustrated. 18s.) Cambridge: Cambridge University Press. 1955.

This book records the papers and discussions of a symposium held in February 1954. The first two papers are from Edinburgh and record the development of chemical methods for the estimation of urinary œstrogens. The authors, Drs. Brown and Bauld, worked independently but kept in close touch with each other, and it is interesting to have recorded the similarities and dissimilarities of the two techniques. Both appear to have evolved a not too complicated chemical colorimetric method which gives reproducible results.

Dr. Boscott of Birmingham has attacked the problem of urinary œstrogens from a different angle. He has used paper chromatography and differential staining to isolate and partly identify some hundred or so phenolic and steroid substances found in human urine. So many of these appear to be derived from food that he suggests putting the subject on a synthetic diet to simplify the problem of detecting the endogenous end-products of steroid metabolism.

The group working at University College Hospital have attacked the problem by the use of differential distribution in pairs of solvents, followed by partition chromatography using a column and final estimation by fluorimetry.

Dr. Diczfalusy of Stockholm described the separation of traces of œstrogens from human

semen by solvent partition counter-current distribution and final fluorimetry, and Dr. Mitchell of Sheffield reported his studies on the technique for estimation of œstrogens in human placenta. The methods used (chemical extraction, followed by paper chromatography and fluorimetry) recover added œstrogens very imperfectly, but were nevertheless able to indicate the existence of significant amounts of the various œstrogens.

From King's College Hospital came the only fully biological attack on the assay of urinary œstrogens and the results of many clinical tests were reported. In particular the usefulness of studying the interrelationship of the urinary œstrogens to gonadotrophin in the various phases of the menstrual cycle in disease was demonstrated. Finally, Dr. Bishop summed up the value of all this work to the clinician.

No paper gave working details—the underlying principles and the difficulties were, however, fully gone into, both in the papers and in the ensuing discussions. Likewise only illustrated examples of the clinical results were given. This book will be of considerable interest to all laboratory workers in this field, and also to any clinical endocrinologist who is really interested in the various tests he asks his laboratory to perform.

Reactions with Drug Therapy. By Harry L. Alexander, M.D. (Pp. xii + 301; illustrated 52s. 6d.) Philadelphia and London: W. B. Saunders Company. 1955.

With the great increase in variety and efficiency of modern drugs a situation has arisen whereby the practitioner is confronted with an increasing possibility of sensitization, either cutaneous or systemic, occurring with the drugs he is now called on to employ. Professor Alexander's book deals primarily with the sensitization types of reaction rather than with the so-called side actions. The previous experience of the author has naturally most interested him in those types of drug reaction involving immunological or allergic effects. This rules out the consideration of such effects as will ordinarily have been seen at different dose-levels in different individuals. The incidence of drug hypersensitivity as yet is small considering the population actually exposed to risk, but the incidence does seem to be increasing. It was perhaps the sulphonamides that first showed in a large way the possibilities of hypersensitization, and some of the antibiotics are showing analogous potentialities.

In the early chapters the author discusses the general mechanisms involved, then the general dermatological and systemic reaction patterns. The dermatological manifestations run the gamut of the known skin reaction patterns, while the systemic reactions are more limited, involving blood dyscrasias, reactions of the serum sickness and shock type, bronchial asthma, hepatitis and polyarteritis. The fact that most of the so-called hypersensitivity reactions fall into a certain definite series of types, despite the very varied chemical constitution of the causative agents, suggests the probable involvement of some immunochemical type of reaction at the end of the reaction chain. In a number of cases it has been shown that these drugs may combine in varying degrees with protein. If this is the basal mechanism then the small number of reaction types is not surprising. The evidence for the intervention of some allergic type of reaction as the causal factor cannot always be shown directly either in the patient or in the experimental animal. Yet the close similarity of the symptoms with those occurring in the known allergies, the production of antibodies of different types on occasion and the occasional possibility of the passive transfer of drug sensitivity, all add up to make this explanation the most reasonable so far available despite the incompleteness of the evidence. Some types of reaction are probably due to histamine liberation, and the author noted that reactions with dextran occurred with greater frequency than might have been expected from hypersensitivity alone, and the consistent changes occurring on the infusion of 6% dextran for an hour in five volunteers were best explained on such a basis. Later experimental evidence not described indicates histamine liberation to be a marked feature in the experimental animal when dextrans of a certain average molecular weight are given. In the later chapters the drugs are studied under the general headings of anti-infectious (including the chemotherapeutic and antibiotic types), cardiovascular and sedative drugs, antithyroid, antihistamines, organ extracts, vitamins, sera and vaccines, plant products, local anæsthetics and the rest. Despite the wideness of the field the literature is covered very thoroughly, and it is not confined to Anglo-Saxon sources. Stress is naturally most on the clinical aspects and such treatment as has been found useful is indicated. The proof reading has been thorough, the reviewer noted only two minor errors, page 214, line 3 (Epinephrine) 29 for 92, and page 246, the heading Psyllium Seed has been dropped to below the first line of the relevant paragraph.

For those interested in drug reactions this book will be a valuable source of information. The illustrations are very useful but it is a pity that they have not been reproduced in colour although this would have undoubtedly increased the cost of the book. It will be a useful addition to the hospital library.

Clinical Section

President—JAMES L. LIVINGSTONE, M.D., F.R.C.P.

[*March* 11, 1955]

Volvulus of Stomach.—S. KARANI, M.R.C.P., and N. TANNER, F.R.C.S.

K. Y., male, aged 6 years. Three weeks' history of intermittent abdominal distension. Later central abdominal pain lasting a few minutes associated with vomiting, and bowels inclined to be loose. Recently he had not appeared to thrive.

On examination.—General health good. Abdominal distension present, the degree of which varied from time to time. Nothing else abnormal noted. Attempts to relieve the distension by Ryle's tube and oral Prostigmin failed, but with the help of a stomach tube it was possible to keep him deflated.

Investigations.—Straight X-ray of the abdomen showed that the whole of the large bowel and to a lesser extent the stomach and the small bowel were distended with gas (Figs. 1 and 2). Ba meal (Dr. T. Griffiths) showed a volvulus of the stomach with normal pyloric function

FIG. 1.—Straight X-ray of the abdomen showing distended stomach and guts.

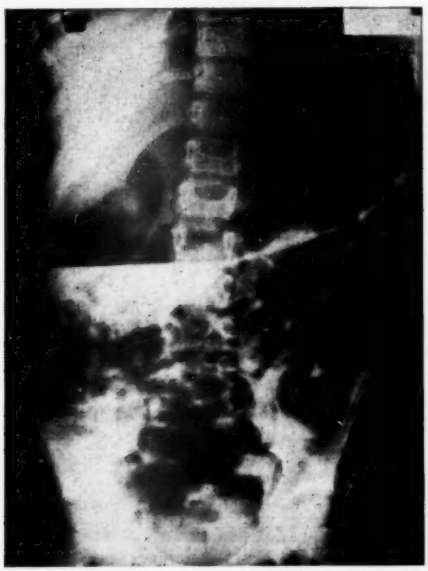

FIG. 2.—Straight X-ray of the abdomen showing distended stomach and guts. Note the change in the size of the stomach.

Fig. 3). X-ray chest, barium enema, blood count, blood urea, serum proteins, serum acid and alkaline phosphatase, serum calcium, stool including fat analysis and urine: all normal.

At operation it was found that the stomach was large and hypertrophied, as far as the duodenal bulb, after which there was a thick fibrous band from the anterior wall of the duodenum to the inferior surface of the liver, unassociated with duodenal ulcer. The rest of the abdominal viscera were normal. The gastro-colic omentum was divided to allow the transverse colon to enter the left subphrenic region and the stomach was stitched to the

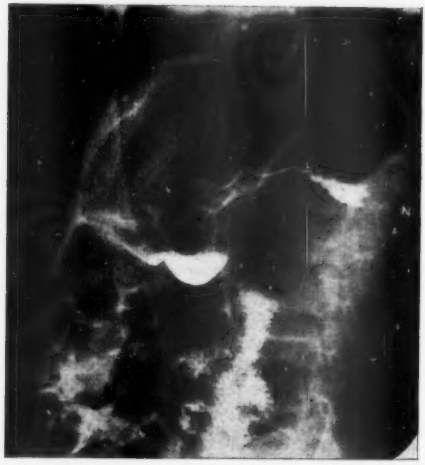

FIG. 3.—Barium meal showing volvulus of the stomach.

ligamentum teres. There were many enlarged glands throughout the small intestine, which were considered normal. The appendix was removed.

Barium meal after the operation showed a normal stomach (Figs. 4 and 5).

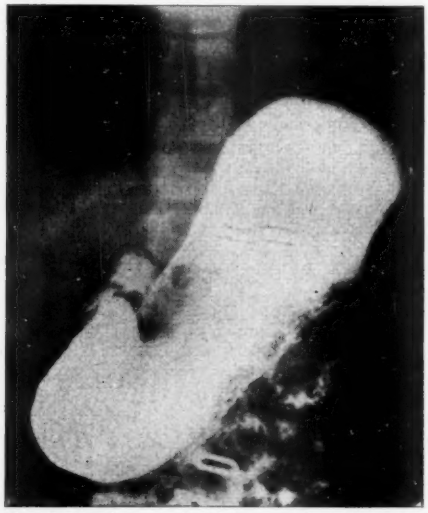

FIG. 4.—Barium meal, after operation showing a normal stomach.

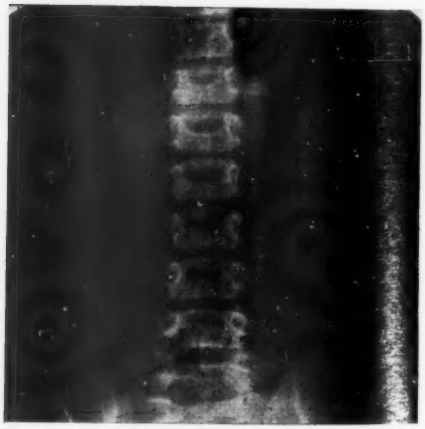

FIG. 5.—Straight X-ray of the abdomen after the operation.

Comments.—Volvulus of stomach is generally seen in adults associated with either eventration of the diaphragm or hiatus hernia or after phrenic avulsion or in association with duodenal ulcer. It is most unusual to have a volvulus of stomach in a child at this age and we have not seen it before. One of us (S. K.) has not been able to find a similar case in the literature. The cause of volvulus in this patient appears to be the thick fibrous band which was seen at operation and the nature of which remains obscure. The rotated stomach makes it difficult for the swallowed air to be eructated and it therefore passes into the guts producing abdominal distension which varies in degree from time to time. The boy has made a perfect recovery.

Migraine with Sphenoiditis.—H. G. BEDFORD RUSSELL, F.R.C.S.

Mrs. A. M., aged 43, seen 1935, complaining of left ophthalmic migraine for many years. No clinical signs of sinusitis, but hæmolytic streptococci grown from postnasal space. The skiagram was preceded by a lipiodol displacement (Fig. 1).

5.11.35: Left sphenoid exenterated by sublabial route. The sphenoid was found to be crammed with polypi, from the interior of which hæmolytic streptococci were grown in pure culture.

The migraines ceased immediately and had not recurred when seen on 4.2.55—twenty years later.

FIG. 1.—Before operation. Skiagram indicates left sphenoidal block. Oil was accepted by right sphenoid and refused by (transradiant) left sphenoid.

Disseminated Lupus Erythematosus Presenting as Pneumonia.—J. S. JENKINS, M.D., M.R.C.P. (for A. W. SPENCE, M.D., F.R.C.P.).

G. G., male, aged 41.

Admitted to hospital in April 1954 complaining of severe pain under the right costal margin. During the previous eighteen months he had suffered from intermittent joint pains, mostly in the hands.

On examination.—He was pale and sweating; temperature 101·4° F.; pulse 112; respirations 36. Rales were audible at the base of the right lung. The blood pressure was 125/70. There was rigidity of the right upper quadrant of the abdomen but no palpable viscera.

Progress.—Oxytetracycline 500 mg. q.d.s. was given but his condition deteriorated during the following two weeks, and clinical signs of consolidation at both lung bases became apparent. The respiration rate and pulse rate remained very high, and there was extreme pallor tinged with cyanosis.

Investigations.—Hb 98% (14·5 grams% Haldane). W.B.C. 15,000 with polymorphonuclear leucocytosis. E.S.R. 95 mm. in one hour (Westergren). X-ray of chest showed consolidation and collapse of both lower lobes (Fig. 1). Sputum was purulent and blood-stained but culture yielded no pathogens.

Further progress.—During the next two months there was a gradual improvement, but the chest signs and X-ray appearances were very slow to clear and resolution was incomplete.

Six weeks after admission, red tender subcutaneous nodules appeared on both forearms but cleared after five days. At the same time there was an exacerbation of the joint pains, although there was little swelling. Seven weeks after admission, when the chest signs had largely abated, the pulse-rate suddenly rose to 130. An ECG showed auricular flutter. Digitalis in large doses converted this to auricular fibrillation, and on stopping the drug normal rhythm returned.

Further investigations.—Serum proteins 7·7, albumin 3·4, globulin 4·3 grams per 100 ml. Electrophoresis showed a greatly increased gamma globulin.

FIG. 1.—Chest X-ray ten days after admission showing bilateral basal consolidation.

Urine showed no albumin, no red cells, and culture was sterile. Blood urea 36 mg. per 100 ml. E.S.R. remained elevated at 90–100 mm. in one hour.

Two months after admission numerous lupus erythematosus cells were found in the peripheral blood, and confirmed on three subsequent occasions.

Treatment.—Oral cortisone, 100 mg. b.d. was given initially reducing to a maintenance dosage of 25 mg. t.d.s. and this has continued to the present day.

Present state.—Recurrent arthritic pains and dyspnœa on moderate exertion. E.S.R. 60 mm. in one hour. X-ray of chest shows streaky shadows at both lung bases, suggestive of residual fibrosis (Fig. 2).

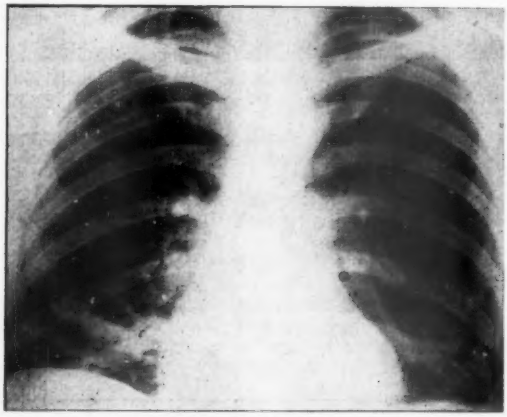

FIG. 2.—Chest X-ray five months after admission showing bilateral fibrosis.

Comment.—During the first few weeks after admission bilateral pneumonia dominated the clinical picture, although it was atypical in its long duration and incomplete resolution uninfluenced by oxytetracycline.

The development of a cardiac arrhythmia, a fleeting skin eruption, joint pains, persistently high E.S.R. and raised gamma globulin subsequently indicated that a disseminated systemic disease should be considered. A firm diagnosis, however, could only be made when lupus erythematosus cells were found in the peripheral blood.

Cortisone therapy was not started until two months after admission, so that it is not possible to state whether it would have hastened resolution of the pneumonia. It has relieved the joint symptoms, although the E.S.R. remains elevated and L.E. cells were still present two months after cortisone was started.

Although involvement of the lungs during the course of disseminated lupus erythematosus has been recorded several times, it would appear to be very uncommon for this disease to present as pneumonia. The pathological changes in the lung, according to Baggenstoss (1952), are mucinous œdema of the alveolar wall, followed by histiocytic infiltration, fibrinoid necrosis and fibrosis. Matthews and Meynell (1954) have recently described a case similar in almost every respect to that reported here. These authors suggest that cases of pneumonia of long duration, taking an atypical course, should be examined for lupus erythematosus cells.

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Acute Emphysematous Cholecystitis.—D. TOOMS, F.R.C.S. (for DONALD BARLOW, M.S., F.R.C.S.).

Mr. E. A., aged 63.

24.2.54: Emergency admission as a case of acute cholecystitis with jaundice.

History.—One week: Attacks of pain in the right hypochondrium. Two days: Very severe pain associated with onset of jaundice. Pain radiated round the right costal margin to the lower back, associated with flatulent dyspepsia.

During the past six months, patient admitted that he had had polydipsia with decrease in appetite.

On examination.—Fit, well-preserved man, somewhat obese and definitely icteric. Examination of the abdomen revealed some distension with marked tympanites; extreme tenderness in the right hypochondrium over an easily palpable mass; Murphy's sign positive.

Investigations.—Urine: Glycosuria and marked ketosis. Plain X-ray of the abdomen revealed the gall bladder filled with gas. Blood: Hb 118%; W.B.C. 6,900. Van den Bergh: Direct reaction biphasic; indirect reaction 2·5 mg. bilirubin %. Barium meal X-ray revealed no organic disease of the œsophagus, stomach or duodenum, the small or large bowel. No evidence of fistulous communication between the gall bladder and gut. The gall bladder and cystic duct were full of gas, and surgical emphysema of their walls was present.

FIG. 1.—Cholecystogram showing elevation and fragmentation of mucosa due to submucosal gas.

FIG. 2.—Barium meal combined with cholecystogram showing no fistulous connexion.

Cholecystogram (Fig. 1) showed the gall bladder completely filled with air and the raising of the mucosa from the submucous layer.

Barium meal and combined cholecystogram (Fig. 2) showed no fistulous connexion with stomach or duodenum.

Intravenous cholangiogram (Fig. 3) (using Biligrafin) showed the shrivelled remnant of the gall bladder and cystic duct adjoining the outline of the biliary tract. This was taken six weeks after the patient had been discharged from hospital.

FIG. 3.—Intravenous cholangiogram, showing shrivelled remnant of gall bladder containing gas.

A diagnosis of acute emphysematous cholecystitis and diabetes mellitus was made.

Treatment.—The diabetes was brought under control with insulin and diet. The cholecystitis was treated with a six days' course of Aureomycin.

Discussion.—This case of emphysema of the gall bladder was shown because of its rarity and because of the difficulty in deciding on correct treatment.

The patient, a man of 63, presented as a case of acute cholecystitis. It was only when the plain radiograph of the abdomen showed a large translucent shadow that the ultimate diagnosis was suspected.

It is unusual to find gas in the biliary tract but it has been described in two groups of conditions. First, it is found when there is a fistulous connexion between the biliary tract and the alimentary canal, this being by far the more common variety. Secondly, gas is found in cases of acute emphysematous cholecystitis. This latter condition, of which the present case is an example, is very rare.

The first case of emphysema of the gall bladder in which a pre-operative diagnosis was made was reported by Hegner in 1931. The diagnosis was made on radiography. Subsequent cases have usually been diagnosed in the same manner. So far, 23 case reports are available in the literature. The clinical findings are practically indistinguishable from a typical case of acute cholecystitis. The outstanding feature of all these cases is their association with diabetes. Almost all reported cases have been diabetics. Cases have occurred at all ages but more commonly after the age of 60. Gas in the gall bladder is a product of bacterial fermentation and in most cases bacterial cultures have been carried out and *Clostridium welchii* has been found, but coliform organisms were found in a few instances. Apart from the presence of a gas-forming organism, there are probably other ætiological factors and it seems likely that a combination of infection and thrombosis in the submucosal layer is the primary lesion. This process would supply the protein medium and the presence of abundant sugar in the serum would produce the optimal conditions for a gas-forming organism. The patients are usually at the age of advancing arteriosclerosis, which would be especially marked in diabetic patients, and this would facilitate submucosal thrombosis and overwhelming infection. A similar pathological process may occur in diabetic patients with perinephric abscess, due to gas-forming organisms. In these circumstances gas is demonstrable radiologically and the usual organism isolated has been of a coliform type.

The diagnosis of emphysematous cholecystitis is established by the radiological findings of gas within the lumen of the gall bladder. A further characteristic feature is the presence of small bubbles of gas within the gall bladder producing a definite mucosal pattern, together

with a "streakiness" in the outline of the gall bladder. These findings, together with the development of a fluid level in serial films, establish a diagnosis of acute emphysematous cholecystitis in preference to that of a fistulous connexion with the alimentary tract.

Treatment of this case has been conservative and it is noted from the literature that operation carries a high mortality. The indications for operation would appear to be the presence of gas bubbles outside the lumen of the gall bladder and negative serial films or clinical signs as shown by emphysematous cellulitis of the abdominal wall. Practically all the cases of operation in the acute stage were performed in the days before the present range of antibiotics was available. Our patient has improved rapidly as the diabetes has been brought under control and after his course of antibiotic therapy. The latest radiographs show that radiological improvement has taken place and it is proposed to continue conservative treatment.

I am indebted to Dr. H. J. Hagger for the radiological investigations.

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Mr. G. Qvist suggested that the high mortality rate of cholecystectomy for this type of case is due to contamination of the muscle in the anterior abdominal wall by the very virulent concentrate of *Cl. welchii*. This organism can exist in the tissues without causing severe toxæmia provided there is no muscle damage, a condition recognized as anaerobic cellulitis. Exposure of bruised or devitalized muscle, however, is necessary for the condition of gas gangrene to develop. The latter is a clinical condition to be diagnosed at the bed side and not merely on a bacteriological finding.

Pituitary Fossa Tumour.—IRENE S. CADE, F.R.C.S. (for E. J. RADLEY SMITH, M.S., F.R.C.S.).

J. F., male, aged 58.

History.—Admitted in a state of extreme salt and water depletion, with a history of occasional vomiting after meals for a year. Ten days prior to admission, vomiting became persistent and copious, and a left proptosis developed gradually over a period of three or four days.

On examination.—He was severely dehydrated. There was proptosis of the left eye (Figs. 1 and 2), with a dilated, fixed pupil and almost complete ophthalmoplegia, the only movement being minimal abduction. There was no papillœdema and visual fields were full.

FIGS. 1 and 2.—Pituitary fossa tumour causing unilateral proptosis.

He appeared older than his 58 years, and had a rather sallow complexion, scanty axillary and pubic hair and small atrophic testicles, suggesting long-standing hypopituitarism.

Intravenous therapy brought about a gradual improvement in his general condition. Vomiting ceased after six days, and there has been slight improvement in the left ocular movements in the last five weeks.

Investigations.—Straight X-rays of the skull (Figs. 3 and 4) show complete destruction of the pituitary fossa, with extension of the bone destruction forward into the sphenoid on the left side. The sphenoidal fissure on the left side is widened and the lateral margin eroded. The left optic foramen is enlarged. There is no evidence of a lesion extending upwards from the pharynx, and no calcification is seen. Carotid arteriograms show slight lateral displacement of the carotid systems.

Examination of the nasopharynx has not revealed a tumour arising in this situation.

FIG. 3.—Lateral X-ray of skull showing destruction of pituitary fossa.

FIG. 4.—A.P. view of skull showing erosion of sphenoidal fissure.

Blood urea was 218 mg.% on admission, falling to 68 mg.% after rehydration, and urea clearance was 11% of normal suggesting associated renal disease. The urine contains a trace of protein but no red cells or casts.

Insulin tolerance test is within normal limits, using a half-dose of insulin. Basal metabolic rate was −11%, but this was not considered a truly basal reading, and a radioactive iodine test showed a twenty-four-hour uptake in the neck of only 6% of the dose, suggesting gross absence of thyroid function. The twenty-four-hour urinary excretion of 17-ketosteroids was only 2·4 mg.

The low ketosteroid excretion and reduced thyroid function thus confirm the diagnosis of hypopituitarism suggested clinically. The normal insulin tolerance curve suggests that glucocorticoid activity is still satisfactory. It is concluded that there is a deficiency of thyroid stimulating hormone and gonadotrophins, but the output of ACTH is probably still adequate.

Diagnosis.—There is an expanding lesion in the region of the pituitary fossa, with extensive destruction of the pituitary gland. The most probable lesion would appear to be a chromophobe adenoma with suprasellar extension. It is possible that recent degeneration to an adenocarcinoma has occurred, thus accounting for the acute onset of local symptoms, and the X-ray appearances, which are more suggestive of a malignant lesion. Other possibilities which have been considered are: aneurysm, excluded by the arteriograms; craniopharyngioma, this occurs at a younger age and usually shows calcification; suprasellar meningioma, this usually produces sclerosis of bone rather than destruction; nasopharyngeal tumour, of which no evidence is found locally; chordoma and secondary deposit from a primary carcinoma elsewhere, which are rapidly progressing lesions unlikely to account for the long-standing pituitary deficiency.

Treatment.—As the patient has refused operation, he is being treated by radiotherapy. Replacement therapy for the hypopituitarism is planned on the following lines: testosterone implant of 400 mg. intended to last about four months, cortisone 12·5 mg. twice daily, and when stabilized on this, thyroid ½ grain daily initially and subsequently increasing to 1 grain daily.

Dr. Richard Asher: I think the tumour in this man's pituitary fossa must be a chromophobe adenoma, but one which has extended much farther forward than usual. The absence of any acromegalic changes is against an eosinophil adenoma. It could be a secondary deposit from a primary carcinoma of bronchus (a not uncommon site) but one would have expected greater cachexia with such an advanced lesion if it was malignant.

Certainly the man gives a clinical picture of gross panhypopituitarism and the clinical response to cortisone (and probably thyroid and testosterone as well) might be very gratifying.

I showed a case at the meeting of this Section on January 14, 1955 (not published), with a similar endocrine picture due to a craniopharyngioma and he did very well with these hormones.